LOWER SOUTHEAST FLORIDA HURRICANE EVACUATION STUDY

DADE COUNTY
BROWARD COUNTY
PALM BEACH COUNTY

APPENDIX

TRANSPORTATION ANALYSIS

CORPS OF ENGINEERS
FEDERAL EMERGENCY MANAGEMENT AGENCY
NOAA NATIONAL HURRICANE CENTER
FLORIDA DIVISION OF EMERGENCY MANAGEMENT

TRANSPORTATION ANALYSIS

BROWARD COUNTY

TRANSPORTATION ANALYSIS CHAPTER

(Broward Version)

Lower Southeast Florida Hurricane Evacuation Study
Technical Data Report

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During a hurricane evacuation effort, it is widely recognized that a large number of vehicles have to be moved across a road network in a relatively short period of time. The number of vehicles and evacuees becomes particularly significant for an area such as Broward County where major urban areas and vulnerable permanent and seasonal communities are located. The magnitude of evacuating vehicles varies depending upon the intensity of the hurricane, presence of seasonal residents and certain behavioral response characteristics of the vulnerable population.

Vehicles enter the road network at different times depending on the evacuee's response relative to an evacuation order or advisory. Conversely, vehicles leave the road network depending on both the planned destinations of evacuees and the availability of acceptable destinations such as public shelters, hotel/motel units and friends' or relatives' homes in non-flooded areas. Vehicles move across the road network from trip origin to destination at a speed dependent on the traffic loadings on various roadway segments and the ability of the segments to handle a certain volume of vehicles each hour.

The overall goals of the transportation analysis performed for the Broward portion of the Lower Southeast Florida Hurricane Evacuation Study were to estimate clearance times (the time it takes to clear a county's roadways of all evacuating vehicles), to define the evacuation road network, and to look at general traffic control issues that could affect traffic flow along critical roadway segments. Clearance time is a value resulting from transportation engineering analysis performed under a specific set of assumptions. It must be coupled with pre-landfall hazards data to determine when a strong evacuation advisory must be issued to allow all evacuees time to reach safe shelter before the arrival of sustained tropical storm winds. Factors that influence clearance time must be studied intensively to determine which factors have the strongest influence.

The transportation analysis task initially identified the kinds of traffic movements associated with a hurricane evacuation that must be considered in the development of clearance times. Basic assumptions for the transportation analysis were then developed related to storm scenarios, population-at-risk, behavioral and socioeconomic characteristics, the roadway system and traffic control. A transportation modeling methodology and a roadway system representation were developed to facilitate model application and development of clearance times. General information and data related to the transportation analysis are presented in summary form in the Technical Data Report. A Transportation Model Support Document will be available through the Jacksonville District Corps of Engineers and will include a detailed account of all transportation modeling activities and zone by zone data listings for the county.

EVACUATION TRAVEL PATTERNS

Traffic movements associated with hurricane evacuation have been identified for the purposes of this analysis by five general patterns:

A. In County Origins to In County Destinations

Trips made from storm surge vulnerable areas, and mobile home units in the county to destinations within the same county, such as public shelters, hotel and motel units, and friends or relatives outside the storm surge vulnerable areas.

B. In County Origins to Out-of-County Destinations

Trips made as in category A that originate in the county but have destinations in other counties of the region or outside the region entirely.

C. Out of County Origins to In County Destinations

Trips made as in category A that enter the county from other counties in the region.

D. Out of County Origins to Out-of-County Destinations

Trips passing through the county while traveling from another county in the study area to either another county or outside the region entirely. This travel pattern is particularly significant due to the effects of Monroe and Dade traffic on the Florida Turnpike, Sawgrass Expressway, and I-95 passing through during an evacuation.

E. Background Traffic

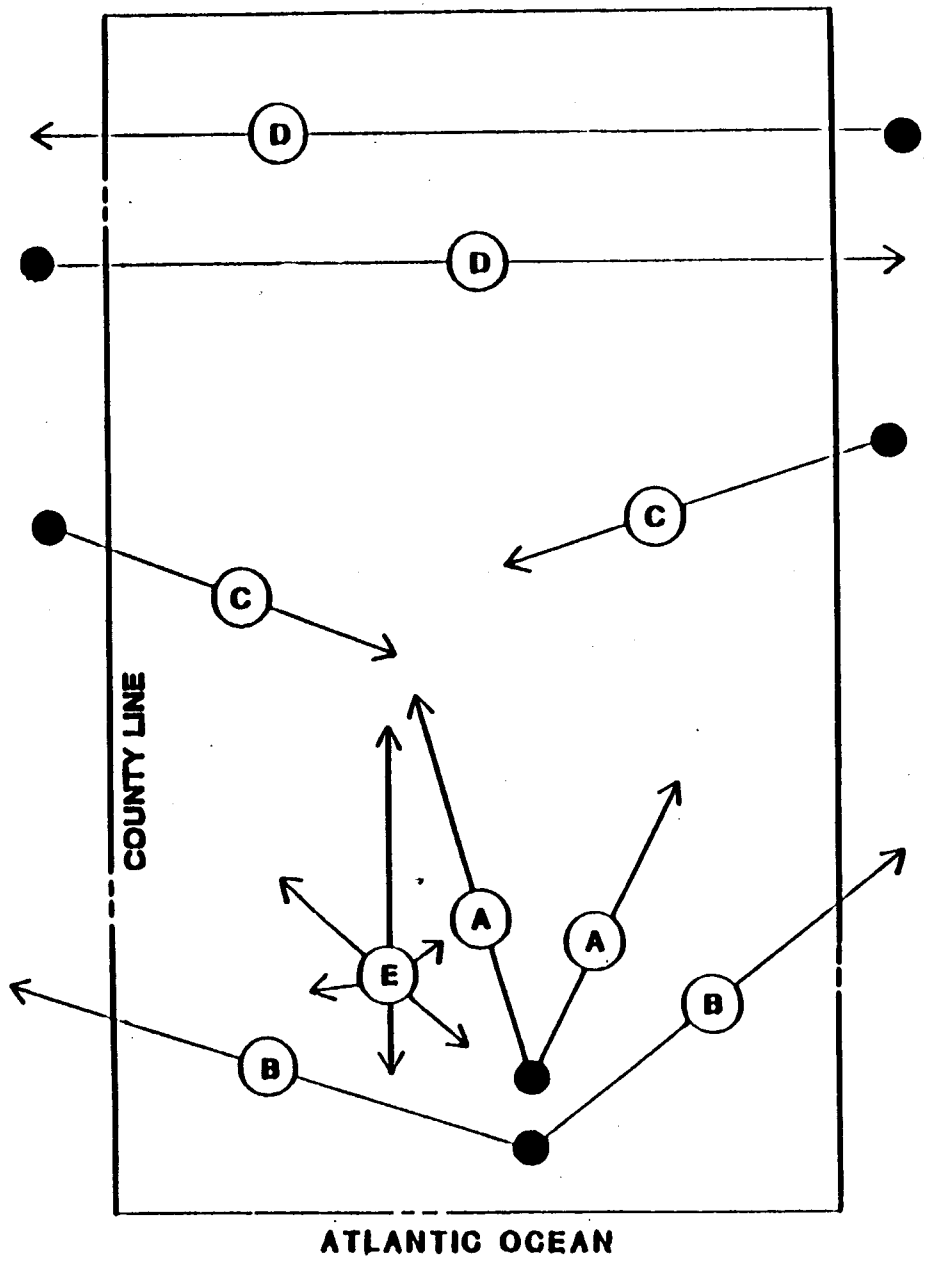
Trips made by persons preparing for the arrival of hurricane conditions; these trips may be shopping trips to gather supplies and/or trips from work to home to assist the family in evacuation. This traffic can also include transit vehicles (vans/buses) used to pick up evacuees without personal transportation.

Figure 6-1 graphically depicts these traffic movement patterns associated with hurricane evacuation situations in Broward County. It is important to recognize that three of the five defined patterns involve traffic movement patterns generated outside of the county's boundaries.

TRANSPORTATION ANALYSIS INPUT ASSUMPTIONS

Since all hurricanes differ from one another in some respect, it becomes necessary to set forth clear assumptions about storm characteristics and evacuees' expected response before transportation modeling can begin. Not only does a storm vary in its track, intensity and size, but also in the way it is perceived by residents in potentially vulnerable areas. These factors cause a wide variance in the behavior of the vulnerable population. Even the time of day at which a storm makes landfall influences the time parameters of an evacuation response.

The transportation analysis results in clearance times based on a set of assumed conditions and behavioral responses. It is likely that an actual storm will differ from a simulated storm for which clearance times are calculated in this report. Therefore, a sensitivity analysis was performed during the transportation modeling. Those variables having the greatest influence on clearance time were



EVACUATION TRAVEL PATTERNS

- (A) In-County Origins To In-County Destinations
- (B) In-County Origins To Out-Of-County Destinations
- (C) Out-Of-County Origins To In-County Destinations
- (D) Out-Of-County Origins To Out-Of-County Destinations
- (E) Background Traffic

Figure 6-1

identified and then varied to establish the logical range within which the actual input assumption values might fall.

Key assumptions guiding the transportation analysis are grouped into five areas.

1. Population Data
2. Storm Scenarios
3. Evacuation Zones
4. Behavioral Characteristics of the Evacuating Population
5. Roadway Network and Traffic Control Assumptions

These five areas and their assumed parameters are described in the following paragraphs. Those parameters which were varied for sensitivity analysis are noted.

Population Data

A 1991 data base for Broward County was interpolated using 1987 base year and 1995 future year data bases available through the Broward County MPO. This source of data by TAZ provided a base for permanent population parameters on a sub-county basis. Since data are regularly updated for these units, their use provides a means to facilitate updating of the evacuation study in the future.

Seasonal and permanent dwelling unit data assembled by PBS&J included the following resources:

* Traffic Analysis Zonal Data Bases - Broward County MPO Staff
* U.S. Census Bureau - 1980 Population and Housing Units.
* 1989 Florida Statistical Abstract
* Memorandum, "Determination of Population Dependent on Transit for Hurricane Evacuation", Broward County Office of Planning, April 1986

The assumed 1991 permanent population for the hurricane study was 1,250,000 in Broward County. The associated number of permanent, mobile home, and hotel/motel/seasonal dwelling units for the county was 593,000, 27,300, and 31,800 units respectively. Estimates of vehicle ownership by sub-area were crucial to translating hurricane vulnerable housing units to vehicle demand for roadways.

Storm Scenarios

The hazards analysis identified those storm tracks causing the worst possible and probable storm surge in Broward County for each of five hurricane intensity categories (corresponding to the Saffir-Simpson scale). When five storm intensities are factored by several varying behavioral parameters, the number of hypothetical hurricane situations can quickly reach 100 or more. Calculation of clearance times for this many storm situations would be cumbersome and unusable by local emergency preparedness officials and would be inappropriate given the relative level of accuracy of hurricane storm forecasting. Storm forecasting for the period 12 to 24 hours prior to eye landfall is generally not precise enough to allow for more than 2 or 3 storm scenarios (grouping by intensity) per county.

Traffic analysis zones were compared with storm surge limits corresponding to the five hurricane categories. This procedure identified where major differences in storm surge limits and number of vulnerable population exist relative to each progressive step in hurricane intensity. The storm scenarios developed in the transportation analysis for Broward County are as follows:

Storm Scenarios	Saffir Simpson Category
A	Category 1-2
B	Category 3
C	Category 4-5

Evacuation Zones

Through the SLOSH model and hazards analysis, those areas which will receive hurricane storm surge were identified and graphically shown on the storm surge atlases provided by the State of Florida. This information became one of the key inputs to the transportation analysis. Those residents who must evacuate as well as those residents who should not necessarily evacuate were defined through discussions with Broward County emergency preparedness staff during the summer of 1990.

Within the transportation analysis it was assumed that persons living in areas flooded by storm surge should be evacuated. This evacuee group included

permanent residents living in single-family, multi-family, or mobile home units, as well as tourists staying in hotel/motel seasonal units located in storm surge vulnerable areas. In addition, mobile home residents living outside the hurricane flooded areas of each county were assumed to evacuate due to high wind vulnerability.

Having established those persons who should evacuate during a particular storm situation, it was then necessary to develop a series of zones to geographically locate and quantify the vulnerable population. Evacuation zones also provide a base to model traffic movements from one geographic area to another. A series of zones was established based on the following factors:

* Zones should relate to expected surge flooding limits (based on Maximum Envelope of Water - MEOWs) for each storm scenario.
* Zones should relate well to traffic analysis zone, census, enumeration district or other data base unit.
* Zones should be set up, if possible, for ease of use in issuing an evacuation order or advisory.
* Zonal boundaries should include identifiable natural features, roadways, landmarks, etc.
* Small "pocket" zones that would be isolated by surrounding surge should be avoided.
* Zones should be able to be served by major evacuation routes.
* Zones should have relatively balanced population levels.
* Zones must allow for appropriate transportation modeling.

For Broward County 44 zones were set-up. The first 13 zones cover the Category 1-2 surge area. The next nine zones (zones 14-22) cover the Category 3 additional surge area. Zones 23 through 28 cover the Category 4-5 additional surge area. The remaining zones 29 through 44 cover the "wind-only" vulnerable area. Appendix A to the Technical Data Report illustrates the evacuation zones established in Broward County for the transportation analysis.

Behavioral Assumptions

Recognizing that the future evacuation of an endangered population due to a hurricane approaching the Lower Southeast Florida study area involves the

coordinated action of thousands of individuals, the Jacksonville District Corps hired Hazards Management Group to gather detailed information through a behavioral analysis pertaining to the tendencies and intended choices of the evacuation population.

PBS&J reviewed these data to derive the best assumptions possible for the transportation analysis. Specifically, for transportation purposes, the following behavioral aspects were addressed:

* Occupancy of hotel/motel units
* Participation rates
* Evacuation rates
* Destination desires
* Vehicle usage

As a hurricane approaches the study area, the number of tourists who may be required to evacuate along with the permanent residents could be significant. For the transportation analysis, two levels of seasonal occupancy were tested in Broward County (25% and 62% occupancy levels of identified seasonal units). For planning purposes, local emergency officials prefer to use data related to the higher occupancy.

Another important behavioral aspect is that of participation rates. Participation rates of those residing in surge flooded zones generally varies between 30 to 90 percent depending on a zone's proximity to the waterfront or coastline. Generally, a 90 to 100 percent participation by those evacuees living in mobile homes outside the surge flooded areas can be assumed. However, for the Broward study area local officials felt it would be best to base the clearance time calculations on 100% participation by surge vulnerable residents and mobile home residents. This planning assumption proved to be prudent in other study areas such as South Carolina during the Hugo situation. In addition, a small percentage (½ to 2% depending on storm intensity) of the theoretical non-vulnerable population was assumed to evacuate their dwelling units in the county. The Transportation Model Support Document provides a listing of all participation rates assumed by zone by storm scenario for the county.

One of the most critical behavioral aspects that must be considered for the transportation analysis is the evacuation rate of the evacuating population. Behavioral data from research of past hurricane evacuations show that mobilization and actual departures of the evacuating population occur over a period of many hours and sometimes several days. For the Lower Southeast Florida study, clearance times were tested for three evacuation rates represented by different behavioral response curves. Behavioral response curves describing mobilization by the vulnerable population define the rate at which evacuating vehicles load onto the evacuation street network for each hourly interval relative to an evacuation order or strong advisory. The percentage of evacuees leaving dwelling units is then available for the calculations relating to traffic loadings at critical links along the evacuation network. The behavioral response curves shown in Figure 6-2 range from rapid response to slow response and are representations of possible mobilization times that might be experienced in a future hurricane evacuation situation. For sensitivity analysis, the mobilization/traffic loading time was varied between three hours and nine hours.

The percentage of evacuees assumed to go to one of four general destination types was another important behavioral input to the transportation analysis. Evacuee destination percentages were discussed with local disaster preparedness officials after careful review of information available in past behavioral research. Figures were developed for the expected percent of evacuees going to public shelters, hotel/motel units, the home of a friend or relative, or out of the county entirely. Destination percentages were varied for each evacuation zone in the county depending on category of risk (distance from coastline) or special characteristics of a zone such as high number of substandard housing units or low income residents. Specific assumptions for each scenario and evacuation zone are provided in the Transportation Model Support Document.

A final behavioral assumption refers to vehicle usage and the percent of households expected to pull a trailer or recreational vehicle during an evacuation. Vehicle usage percentages refer to the percent of vehicles available at the home origin that are assumed to be used in the evacuation. Vehicle usage percentages were approximately 65% to 75% (depending on distance from the coastline) for the Lower Southeast Florida study transportation analysis. The percent of households expected to pull a boat, trailer or RV was approximately 1-5 percent in the immediate coastal area zones.

BEHAVIORAL CUMULATIVE EVACUATION CURVES

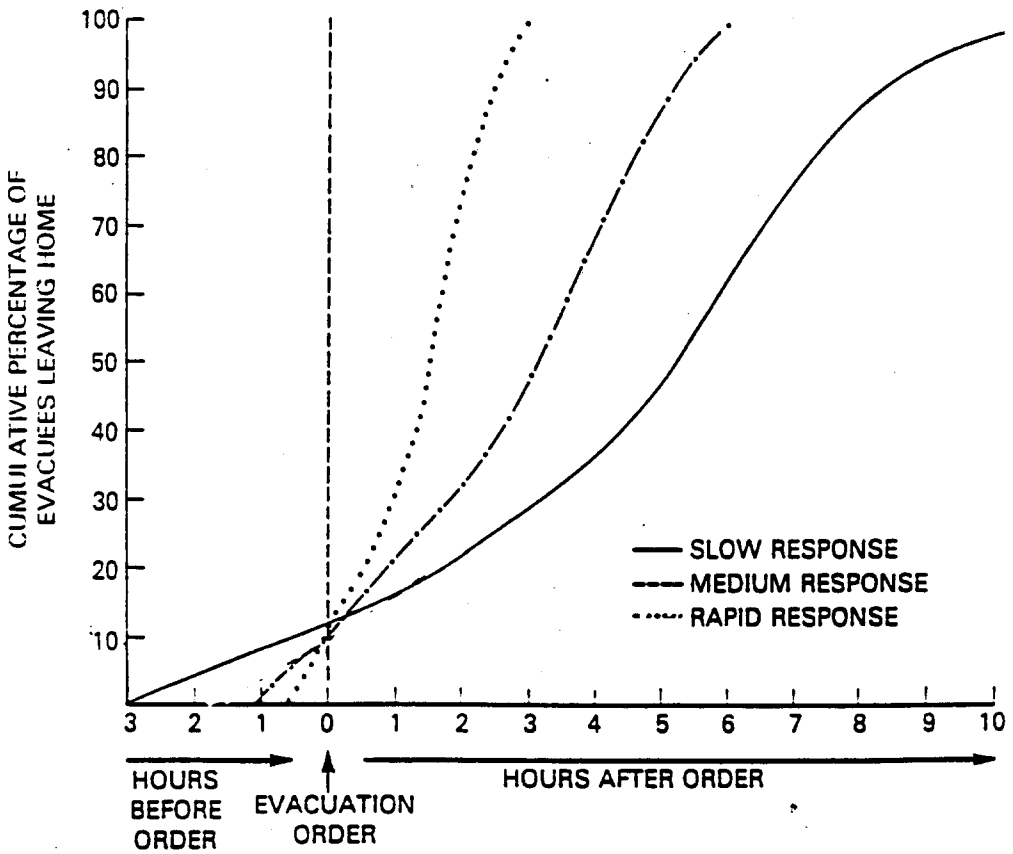


Figure 6-2

Roadway Network and Traffic Control Assumptions

A final group of assumptions used for input to the transportation analysis related to the roadway system chosen for the evacuation network and traffic control measures selected for traffic movement. Although the assumptions developed for the transportation analysis are general, the efforts at state, county and municipal levels regarding traffic control and roadway selection must be quite detailed. Detailed manpower allocations to major intersections, interchanges, and bridges involve extensive coordination among local and state officials. This study does not presume to replace those efforts, but seeks to quantify the time elements within which such manpower would operate.

In choosing roadways to be used for an evacuation network, an effort is made to include street facilities with sufficient elevations, little or no adjacent tree coverage, substantial shoulder width and surface, and roadways already contained in existing hurricane evacuation plans. Another objective is to include east-west arterials and bridge combinations that would provide the smoothest (least disjointed) possible traffic flow.

In order to determine the routing of evacuation traffic a representation of the roadway system was developed. A traditional "link-node" system was developed to identify roadway sections. Nodes are used to identify the intersection of two roadways or changes in roadway characteristics. Links are the roadway segments as defined by the nodes when connected. Each link is identified by a letter designation.

Once the links and nodes for the evacuation routes were identified, roadway characteristics were specified for each link. The characteristics of each link were defined by the following features.

* Number of travel lanes
* Type of facility

Appendix A to the Technical Data Report illustrates the roadway system representations (evacuation networks) for each county in the study area. The significance of link node segments and zone connectors (dashed lines) is explained in the Transportation Model Support Document. The figures consist of base maps

showing all the major streets in the study area with identification of the nodes and centroid connectors in color. Detailed roadway link information is contained in the Transportation Model Support Document.

An important assumption for the transportation modeling was that all drawbriges would be locked down and open to vehicular traffic during a Hurricane Warning period. U.S. Coast Guard regulation 33-117.1(c) may give Civil Defense authorities the ability to implement this procedure. At the present time, request for closure prior to a major disaster occurring (and prior to the warning period) must be directed to the Coast Guard. The Coast Guard, however, has the capability of acting on these requests immediately. It is essential that appropriate bridge regulations be interpreted and implemented to allow for immediate response to an evacuation order. It may be prudent in some areas for boat owners to find safe harbor prior to or during a Hurricane Watch period. The lives of citizens evacuating in vehicles could be at risk if bridges are not allowed to operate at near full capacity during a Hurricane Warning. Bridge openings obviously result in less than full hourly capacity for vehicular movement.

It was assumed that special manpower (state police, local policemen, sheriffs, deputies), will be assigned to critical intersections in the study area. This would allow for smoother traffic flow and would allow east-west traffic movements more intersection "green time." The transportation modeling task also assumes that provisions would be made for removal of vehicles in distress during the evacuation. This may require that agreements with tow-truck operators be worked out in local planning efforts. Tow trucks could possibly be stationed at critical bridge segments and other roadway locations.

Assumptions concerning the road network are that the evacuation of all vehicles will occur prior to the arrival of sustained tropical storm winds (39 mph) and storm surge inundation. Due to the vulnerability of some local roadways to rainfall flooding, some segments may become impassable before the arrival of hurricane related hazards such as storm surge and gale force winds.

In summary, data inputs to the transportation analysis can be classified into one of four categories:

* Hazards Data

* Socioeconomic Data
* Behavioral Data
* Roadway Network

Table 6-1 provides a listing of each major data input for each of the four categories.

OVERVIEW OF TRANSPORTATION MODELING METHODOLOGY

The work tasks involved in performing the transportation analysis are illustrated in Figure 6-3. In addition to the front end development of population data, evacuation zones, and scenarios, the diagram provides the transportation modeling steps in the upper right hand box.

The transportation modeling methodology developed and employed for the Lower Southeast Florida Study Area involved a number of manual and microcomputer techniques. The methodology, while very technical, was designed to be consistent with the accuracy level of the modeling inputs and assumptions. The methodology is unique in that it is sensitive to the key behavioral aspects of evacuees.

The Transportation Model Support Document specifies and explains the steps carried out in the transportation modeling at a detailed technical level. In summary, the modeling methodology involved seven major steps. These steps are briefly described below:

1. Evacuation Zonal Data Development - Data by traffic analysis zone (TAZ) were stratified by evacuation zone. Numbers of permanent residential dwelling units, mobile homes, and tourist units were compiled by zone and formatted for input into trip generation.

2. Evacuation Road Network Preparation - This step involved developing information for those roadways selected for inclusion in the evacuation road network. Information was coded into a "link file" for use by the assignment computer module. The end product of the step was a computerized representation of the roadway system.

3. Trip Generation - Specific dwelling unit variables were used in the trip generation calculations to produce total evacuating people and vehicles originating from each evacuation zone. Originating vehicles and people were stratified by destination type based on behavioral and population parameters

TABLE 6-1

Transportation Analysis Data Inputs

Hazards Data

* Land Areas Flooded for each Category Hurricane
* Public Shelter Useability by Hurricane Category
* Time of Arrival of Gale Force Winds/Roadway Inundation

Behavioral Data

* Rapidity of Response
* Participation Rates
* Destination Percentages
* Vehicle Usage
* Percent Pulling Trailer/Boat
* Presence of Tourists

Socioeconomic Data

* Housing Unit Data
* People Per Housing Unit
* Vehicles Per Housing Unit
* Occupancy Information

Roadway Network

* Number of Lanes by Link
* Facility Types by Link (function of roadway)
* Drawbridge Operations
* Traffic Count Data
* Elevation - "Low Spots"
* Critical Links/Intersections Capacity Data

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WORK FLOW DIAGRAM

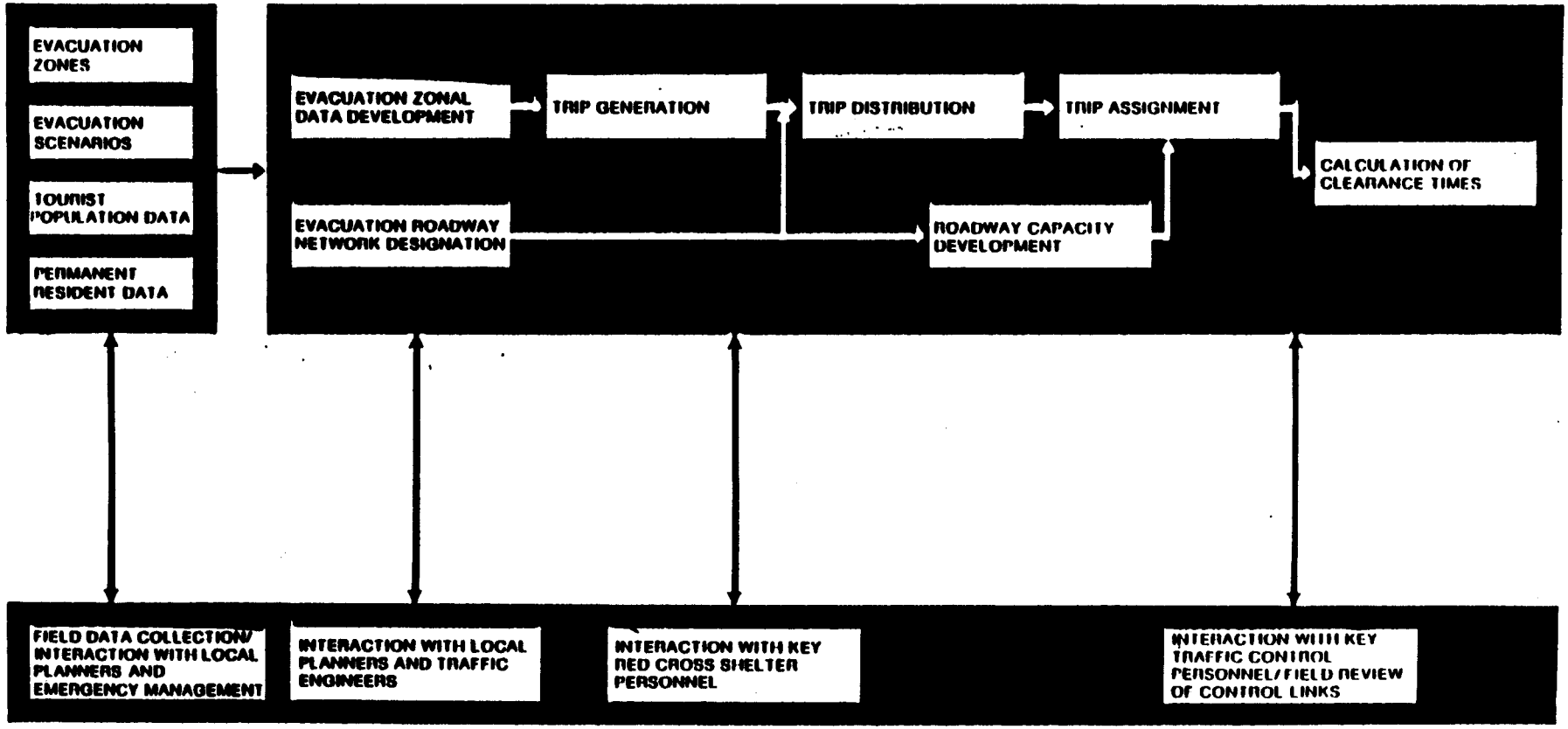

Figure 6-3

previously established. Hotel/motel information coupled with public shelter capacity information were used to develop estimates of the number of evacuating vehicles that would find acceptable destinations in each zone.

4. Trip Distribution - This step concentrated only on those trips originating in a county and finding acceptable destinations within the same county. Productions from each zone were matched with available attractions in all zones. The end product of the step was a trip table showing trips between each zone and all other zones for each evacuation destination type. A unique trip table was developed for each storm scenario, and for each tested behavioral assumption.

5. Roadway Capacity Development - Number of lanes and facility type information for each roadway link in the evacuation network were translated into a general hourly service volume for comparative purposes. Specific hourly flow rates were then developed for the most critical roadway segments and intersections after thorough field review.

6. Trip Assignment - This step included the use of another microcomputer program to assign zone to zone trips onto the road segments included in the computerized roadway system. All other categories of evacuation travel patterns (in-county to out-of-county, out-of-county to in-county, out-of-county to out-of-county, and background) were then added in to arrive at total evacuation vehicles per roadway segment. This step then developed a series of volume to capacity ratios to determine which roadway segments would be most congested by evacuation vehicles. Those links with the highest volume to capacity ratio were identified for each county.

7. Calculation of Clearance Times - Travel Time/Queuing Delay Analysis - This step involved a detailed look at the critical links and intersections identified for the eighteen jurisdictions of the study area. Initially, evacuation zones using the critical link of interest were identified. Evacuation vehicles from each zone were then released to the network in accordance with a behavioral response curve. Based on assumed hourly flow rate for the critical link, the hourly volume desiring to use the link was then translated into a queuing delay time at the link and an evacuation travel time. The end product of this major step was a set of clearance times for each storm scenario.

MODEL APPLICATION

Application of the transportation modeling methodology produced several key data items for hurricane evacuation planning and preparedness. Completion of the transportation modeling produced the following:

1. Evacuating people and vehicle parameters
2. Shelter demand and capacity considerations
3. Traffic volumes and critical roadway segments
4. Estimated clearance times

Although many pieces of information are produced in the transportation analysis, these data items are most critical to planning shelter needs, and defining the timing requirements of an evacuation.

Evacuating People and Vehicle Parameters

Using a microcomputer process, total evacuating vehicles and people produced by each zone were split by destination type (public shelter, hotel/motel unit, friend or relative's home, or out of the county). This was accomplished for each storm scenario and further refined by assumed behavioral characteristics of the population-at-risk. The Transportation Model Support Document provides this data for the evacuation zones of Broward county.

Table 6-2 provides the number of evacuating people for Broward County. The number of people evacuating and vehicles expected to be utilized in hurricane evacuations are given in a range due to the effect of testing different storm scenarios and tourist unit occupancies. Thus, the highest number relates to a high seasonal occupancy and the most severe hurricane storm category. Figures are based on 1991 population estimates and previously discussed behavioral aspects of vulnerability areas relating to the Maximum Envelope of Water limits for all hurricane directions and speeds. It is important to remember evacuating people figures include mobile home residents and a small percentage of persons who will evacuate although theoretically not vulnerable.

Shelter Demand/Capacity Considerations

After matching evacuee's destination desires with available shelters, the transportation analysis revealed that hotel/motel space will not be as widely available within the county as perceived by the evacuating population. For transportation modeling purposes, those evacuees unable to be accommodated by study area hotel/motel space were assumed to find hotel/motel space outside the study area.

Table 6-2 in addition to total evacuating people statistics, provides the calculated public shelter demand by storm scenario. Shelter space is generally adequate in Broward County for in-county demand during a hurricane. However,

TABLE 6-2

BROWARD COUNTY
EVACUATING PEOPLE STATISTICS
Lower Southeast Florida Hurricane Evacuation Study

Storm Scenario	People Evacuating Dwelling Units	People Going t Public Shelter
Category 1-2 Hurricane normal seasonal occupancy	187,355 (130,610 from surge zones of which 8,555 are visitors) (54,080 from mobile homes) (2,665 from "non vulnerable" units) (17,200 - 22,900 transit dependents)	28,510
Category 1-2 Hurricane November seasonal occupancy	200,045 (143,275 from surge zones of which 21,220 are visitors) (54,080 from mobile homes) (2,690 from "non vulnerable" units) (21,750 - 29,000 transit dependents)	29,780
Category 3 Hurricane normal seasonal occupancy	300,570 (241,675 from surge zones of which 9,885 are visitors)) (54,080 from mobile homes) (4,815 from "non vulnerable" units) (26,800 - 35,700 transit dependents)	40,105
Category 3 Hurricane November seasonal occupancy	315,245 (256,305 from surge zones of which 24,515 are visitors) (54,080 from mobile homes) (4,860 from "non vulnerable" units) (32,050 - 42,700 transit dependents)	41,570
Category 4-5 Hurricane normal seasonal occupancy	426,680 (364,160 from surge zones of which 11,590 are visitors) (54,080 from mobile homes) (8,440 from "non vulnerable" units) (36,100 - 48,100 transit dependents)	62,070
Category 4-5 Hurricane late November seasonal occupancy	443,895 (381,310 from surge zones of which 28,740 are visitors) (54,080 from mobile homes) (8,505 from "non vulnerable" units) (42,250 - 56,350 transit dependents)	63,790

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TABLE 6-2 (continued)

BROWARD COUNTY
EVACUATING PEOPLE STATISTICS
Lower Southeast Florida Hurricane Evacuation Study

Key Assumptions

1991 assumed base year population - 1,250,000

1991 Dwelling Units interpolated from the 1987 and 1995 traffic analysis zonal data bases available through the Broward County Planning office.

Occupancy of tourist/seasonal units - two levels (25% and 62%)

Figures include 100% of permanent and seasonal residents in zones colored blue and all mobile home residents for Category 1-2, additional residents in yellow zones for Category 3, and additional residents in pink zones for Category 4-5 - a small portion (¼% - 1%) of the theoretically non-vulnerable population was also included in each scenario.

Assumed percent of evacuees to public shelter was varied by evacuation zone and storm scenario depending on a zone's distance from the coastline and general income level - for example, high income barrier island zone's figures were 8 to 10 percent while "mobile home only" zones were 30 to 35 percent in this regard.

Transit dependents based on assumptions used in the April 1986 memorandum from Broward County Office of Planning regarding population dependent on transit for hurricane evacuation. Figures shown in the table reflect a 75% to 100% range of participation of transit dependents.

public shelters are currently being reevaluated in Broward County and specific locations and available capacity are subject to change. The available capacity of _____ people can handle the range of 28,510 to 63,790 public shelter evacuees expected.

Traffic Volumes and Critical Roadway Segments

The Transportation Model Support Document provides the assigned evacuating vehicle figures by scenario for all roadway segments in the county's evacuation network. In addition, the model document provides the volume to capacity ratios calculated for each link. Those roadway segments with the highest volume to capacity ratios were identified as the critical links for each scenario. Table 6-3 lists the critical roadway segments. Critical links and intersections are listed in order of severity. These links control the flow of evacuation traffic during a hurricane evacuation and are key areas for traffic control and monitoring.

Estimated Clearance Times

The most important product of the transportation analysis is the clearance times developed by storm scenario. Clearance time is one of two major considerations involved in issuing an evacuation or storm advisory. Clearance time must be weighed with respect to the arrival of tropical storm winds to make a prudent evacuation decision. Figure 6-4 illustrates these two timing issues of evacuation and their relation.

Clearance time is the time required to clear the roadways of all vehicles evacuating in response to a hurricane situation. Clearance time begins when the first evacuating vehicle enters the road network (as defined by a hurricane evacuation behavioral response curve) and ends when the last evacuating vehicle reaches an assumed point of safety. Clearance time includes the time required by evacuees to secure their homes and prepare to leave (referred to as mobilization time), the time spent by evacuees traveling along the road network (referred to as travel time), and the time spent by evacuees waiting along the road network due to traffic congestion (referred to as queuing delay time). Clearance time does not relate to the time any one vehicle spends traveling on the road network.

TABLE 6-3

CRITICAL ROADWAY SEGMENTS
Broward County
Lower Southeast Florida Hurricane Evacuation Study

Atlantic Boulevard between U.S. 1 and I-95
Oakland Park Boulevard east of I-95
Florida Turnpike in Palm Beach County
Florida Turnpike in Broward County*
I-95 in Palm Beach County
Commercial Boulevard at U.S. 1
Davie Boulevard at I-95
Hollywood Boulevard at I-95
(All draw bridges)
(All northbound on ramps to Florida Turnpike and I-95)
(All I-95 and Florida Turnpike construction areas)

* For this update of the lower southeast Florida study area, the Florida Turnpike was assumed to be 6 laned throughout Broward County.

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COMPONENTS OF EVACUATION TIME

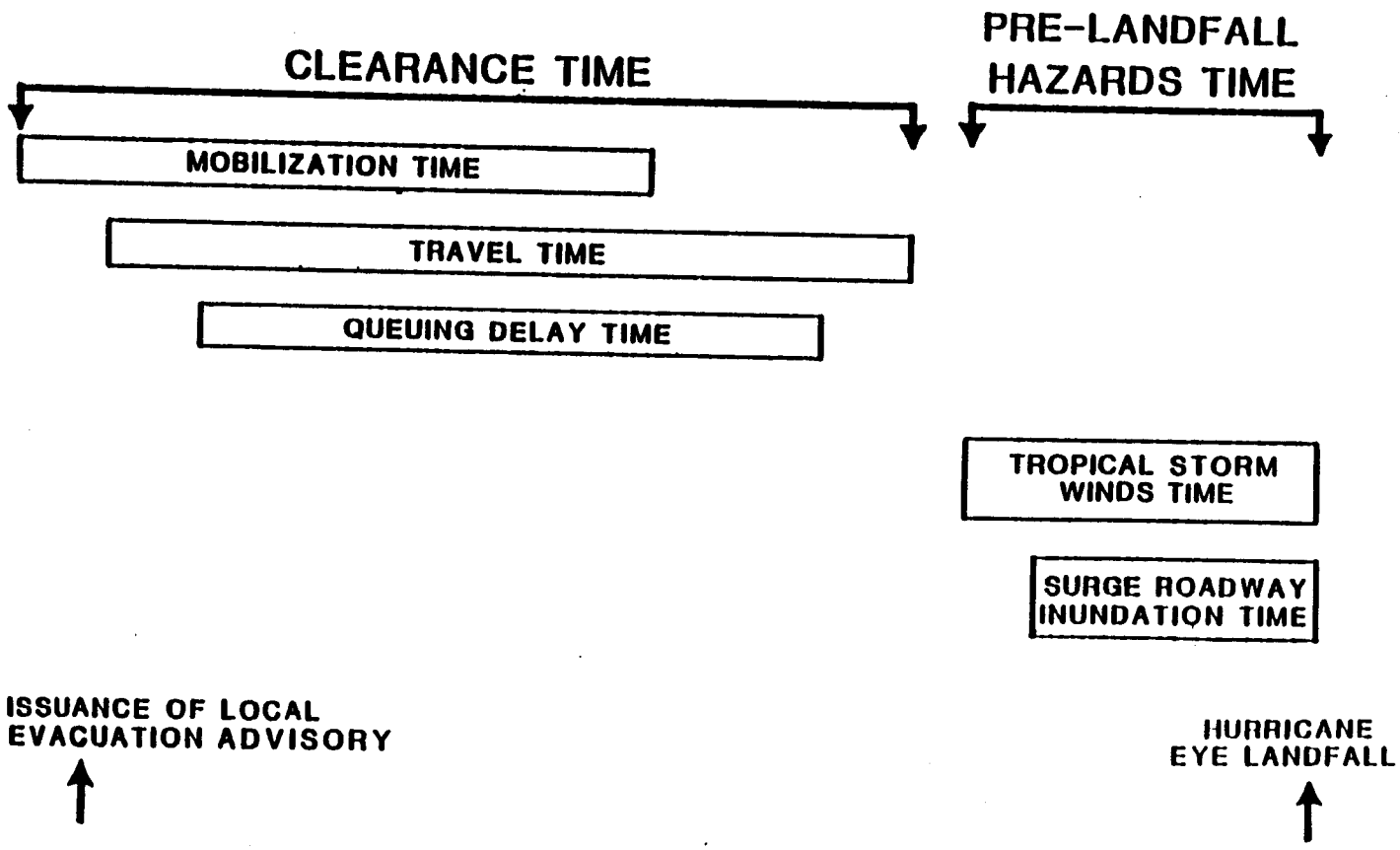


Table 6-4 presents the clearance times estimated for Broward County. Clearance times are stratified by intensity of hurricane (storm scenario), by rate of response on the part of the evacuating population, and by level of seasonal occupancy. Clearance times are presented for local (only) movements as well as for traffic on the Florida Turnpike in Palm Beach County. The times for regional facilities are significant in length and could be much higher as Treasure Coast evacuees from Martin, St. Lucie, and Indian River counties are not factored in. It is important to note that clearance times are based on the assumptions that local officials will attempt to evacuate residents out of dwelling units located in the areas shown as flooded by storm surge (by the SLOSH model). The hazards analysis chapter of the Technical Data Report defines these surge limits and the theory behind their derivation.

TRAFFIC CONTROL ISSUES

The movement of evacuating vehicles during hurricane evacuation requires extensive traffic control efforts to make maximum use of roadway capacity and to expedite safe escape from hurricane hazards. The development of traffic control techniques for critical evacuation roadway links and intersections should always be developed by local police, state highway patrol, state departments of transportation, local traffic engineers, emergency management personnel and the U.S. Coast Guard working together cooperatively. The following traffic control issues are recommended for consideration:

1. The large number of vehicles expected to accumulate on the Florida Turnpike and I-95 during a major hurricane threat necessitates that the State of Florida address multi-regional evacuation movements, reverse lane strategies, and inland shelter supplies/staffing issues (particularly in Orlando).

2. All available tow trucks should be positioned or on call along key travel corridors and critical links. At a minimum, tow trucks should be at major bridge crossings to remove disabled vehicles.

3. Where intersections will continue to have signalized control, signal patterns providing the most "green time" for the westbound approach leading away from the coast should be actuated by the local traffic engineer's office as appropriate.

TABLE 6-4

CLEARANCE TIMES* (in hours)
Broward County
Lower Southeast Florida Hurricane Evacuation Study

Category 1-2 Hurricane	Summer Seasonal Occupancy	Late Fall/November Seasonal Occupancy
Rapid Response	11¼	11½
Medium Response	12½	13
Slow Response	14¼	14¾
Category 3 Hurricane		
Rapid Response	16¼	16½
Medium Response	17½	18
Slow Response	19¼	19¾
Category 4-5 Hurricane		
Rapid Response	21½	22
Medium Response	23¼	24
Slow Response	25¾	26½

* Clearance times shown above reflect congestion levels expected on local Broward County roads for traditional automotive evacuation. Clearance times for Broward County residents going out of county will be much higher for certain scenarios (please see Palm Beach clearance time tables concerning the Florida Turnpike and I-95). It is important to note that local plans call for evacuation of close to 50,000 people using public transportation (buses) in a worst case situation. The mobilization, routing, and carrying capacity of this type of operation will require greater times than those shown above. Local estimates are that buses would need to begin operating approximately 30 hours in advance of storm hazards to service this many evacuees.

TABLE 6-4

CLEARANCE TIMES*
Palm Beach County
Lower Southeast Florida Hurricane Evacuation Study

(Florida Turnpike/I-95 Evacuation Movements)

Category 1-2 Hurricane	Summer Seasonal Occupancy	Late Fall/November Seasonal Occupancy
Rapid Response	15¼	19¼
Medium Response	15½	19¾
Slow Response	16¼	20¼
Category 3 Hurricane		
Rapid Response	24¼	29
Medium Response	24¾	29¼
Slow Response	25¼	30
Category 4-5 Hurricane		
Rapid Response	36½	41¼
Medium Response	37	41¾
Slow Response	37½	42¼

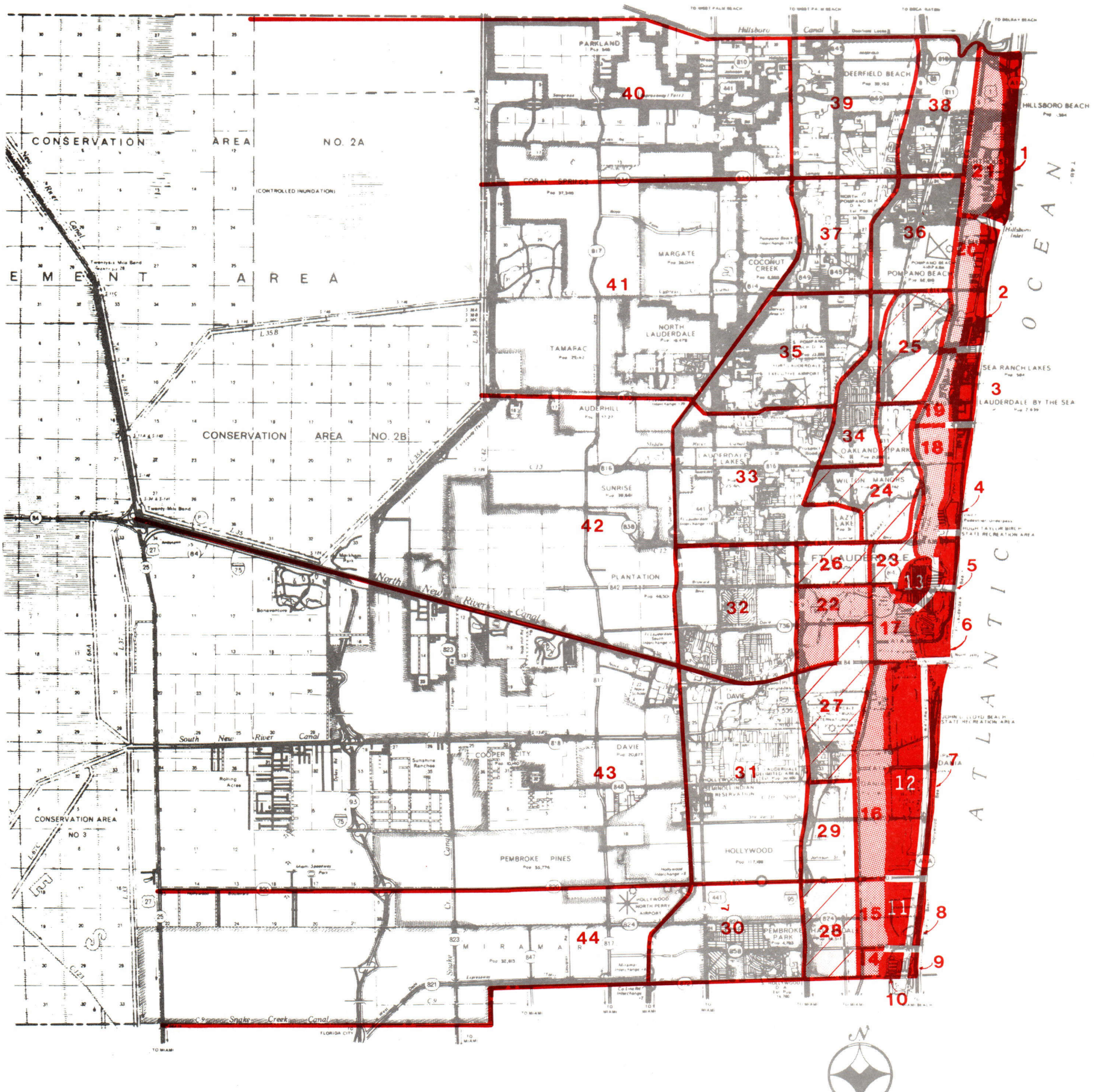
* Clearance times reflect accumulation of Monroe, Dade, Broward and Palm Beach County out of county movements on the Florida Turnpike and I-95. Times could be worse than these "upstream" as Treasure Coast evacuees attempt to evacuate out of county.

4. All draw/swing bridges needed for evacuation should be locked in the "down" position during a hurricane warning if possible. Optimally, recreational vehicles should be moved to safe harbor (if such is available) during or before a hurricane watch. This judgement will need to be made on a case by case basis through discussions between the U.S. Coast Guard, and local emergency officials.

5. Once a hurricane warning is posted for counties in Southeast Florida, toll collections on the Florida Turnpike should be suspended. If bonding requirements do not allow for this, this action could be achieved by the Governor ordering toll attendants to leave their toll booths and go home to prepare for the storm.

BROWARD COUNTY

VULNERABLE AREAS AND EVACUATION ZONES

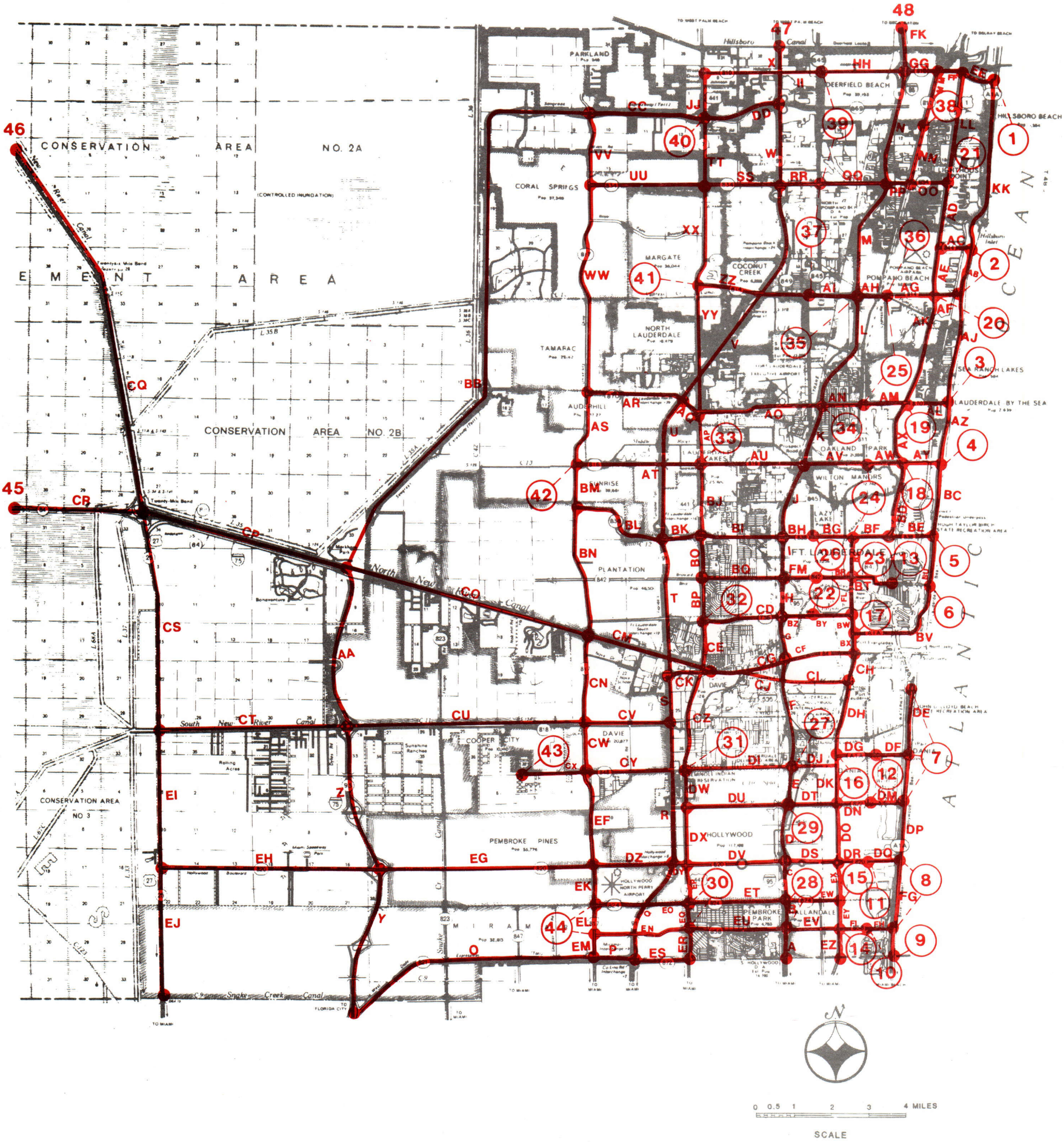


0 0.5 1 2 3 4 MILES

SCALE

Legend

- CATEGORY 1-2 SURGE AREA
- CATEGORY 3 ADDITIONAL SURGE AREA
- CATEGORY 4-5 ADDITIONAL SURGE AREA



Legend

- ● INTERSECTION/INTERCHANGE LOCATION
- (12) ZONE LOCATION
- AB ROADWAY SEGMENT NAME
- 45 COUNTY EXIT POINT

BROWARD COUNTY

EVACUATION ROADWAY NETWORK

LOWER SOUTHEAST FLORIDA HURRICANE EVACUATION STUDY
BROWARD COUNTY TRAFFIC ZONE DESCRIPTIONS

Surge-Zone Descriptions

Zone 1: area east of Intracoastal Waterway, north of Hillsboro Inlet and south of Palm Beach County line

Zone 2: area east of Intracoastal Waterway, north of SE 15th Street, and south of Hillsboro Inlet

Zone 3: area east of Intracoastal Waterway, north of Flamingo Ave., and south of SE 15th Street

Zone 4: area east of Intracoastal Waterway, north of Sunrise Blvd., and south of Flamingo Ave.

Zone 5: area east of Intracoastal Waterway, north of Las Olas Blvd., and south of Sunrise Blvd.

Zone 6: area east of Intracoastal Waterway, north of Port Everglades Inlet and south of Las Olas Blvd.

Zone 7: Area east of Intracoastal Waterway, north of Hollywood Blvd., and south of Port Everglades Inlet

Zone 8: area east of Intracoastal Waterway, north of Hallandale Beach Blvd., and south of Hollywood Blvd.

Zone 9: area east of Intracoastal Waterway, north of Dade County line, and south of Hallandale Beach Blvd.

Zone 10: area east of Layne Blvd., west of Intracoastal Waterway, north of Dade County line, and south of Hallandale Beach Blvd.

Zone 11: area east of 14th Avenue, west of Intracoastal Waterway, north of Hallandale Beach Blvd., and south of Hollywood Blvd.

Zone 12: area east of 14th Avenue, West of Intracoastal Waterway, north of Hollywood Blvd., and south of Port Everglades Inlet/Port Road

Zone 13: Nurmi Isles/Las Olas area east of Victoria Park Road

Zone 14: area east of US 1, west of Layne Blvd., north of Dade County line, and south of Hallandale Beach Blvd.

Zone 15: area east of US 1, west of 14th Avenue, north of Hallandale Beach Blvd., and south of Hollywood Blvd.

Zone 16: area east of US 1, west of 14th Avenue, north of Hollywood Blvd., and south of Port Road

Zone 17: area east of US 1, west of Intracoastal Waterway, north of Port Road, and south of Las Olas Blvd.

Zone 18: area east of US 1, west of Intracoastal Waterway, north of Nurmi Isles/Las Olas area, and south of and including Coral Ridge Country Club

Zone 19: area east of US 1, west of Intracoastal Waterway, north of Coral Ridge Country Club, and south of SE 15th Street

Zone 20: area east of US 1, west of Intracoastal Waterway, north of SE 15th Street, and south of NE 24th Street

Zone 21: area east of US 1, west of Intracoastal Waterway, north of NE 24th Street, and south of Palm Beach County line

Zone 22: area east of I-95, west of US 1, north of SW 24th Street, and south of Broward Blvd., minus area south of Davie Blvd. between SW 9th Avenue and US 1

Zone 23: area east of US 1, west of Middle River and Nurmi Isles, north of Las Olas Blvd., and south of Middle River (south fork)

Zone 24: Wilton Manors and all remaining areas east of Wilton Drive/Old Dixie Highway, west of US 1, north of Sunrise Blvd., and south of Commercial Blvd.

Zone 25: area east of Old Dixie Hwy., west of US 1, north of Commercial Blvd., and south of Atlantic Blvd.

Zone 26: area east of I-95, west of US 1, north of Broward Blvd., and south of Sunrise Blvd.

Zone 27: area east of I-95, west of US 1, north of Stirling Road, and south of SW 24th Street, plus area south of Davie Blvd. between SW 9th Ave. and US 1.

Zone 28: area east of I-95, west of US 1, north of Dade County line, and south of Hollywood Blvd.

Non-Surge Zone Descriptions

Zone 29: area east of I-95, west of US 1, north of Hollywood Blvd., and south of Stirling Road

Zone 30: area east of Florida Turnpike, west of I-95, north of Dade County line, and south of Hollywood Blvd.

Zone 31: area east of Florida Turnpike, west of I-95, north of Hollywood Blvd., and south of I-595

Zone 32: area east of Florida Turnpike, west of I-95, north of I-595, and south of Sunrise Blvd.

Zone 33: area east of Florida Turnpike, west of I-95, north of Sunrise Blvd., and south of Commercial Blvd., plus area west of Wilton Drive between Sunrise Blvd. and NW 19th St.

Zone 34: area east of I-95, west of Old Dixie Hwy., north of Oakland Park Blvd., and south of Atlantic Blvd.

Zone 35: area east of Florida Turnpike, west of I-95, north of Commercial Blvd., and south of Atlantic Blvd.

Zone 36: area east of I-95, west of US 1, north of Atlantic Blvd., and south of Sample Rd.

Zone 37: area east of Florida Turnpike, west of I-95, north of Atlantic Blvd., and south of Sample Road

Zone 38: area east of I-95, west of US 1, north of Sample Rd., and south of Palm Beach County line

Zone 39: area east of Florida Turnpike, west of I-95, north of Sample Rd., and south of Palm Beach County line

Zone 40: area west of Florida Turnpike between Palm Beach County line and Sample Rd.

Zone 41: area west of Florida Turnpike between Sample Road and Commercial Blvd.

Zone 42: area west of Florida Turnpike between Commercial Blvd. and I-595

Zone 43: area west of Florida Turnpike between I-595 and Hollywood Blvd.

Zone 44: area west of Florida Turnpike between Hollywood Blvd. and Dade County Line

09-653.00
tlt:BPb/f

CATEGORY 1-2 NORMAL OCCUPANCY

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating vehicles	1	2	3	4
ZONE NO	BR01	8650					4965				
			700	3683	864	3196		399	2281	495	1785
ZONE NO	BR02	21770					12618				
			1758	9921	2177	7913		1013	5841	1261	4499
ZONE NO	BR03	16316					9385				
			1322	7349	1631	6012		755	4329	938	3370
ZONE NO	BR04	17481					10068				
			1415	7889	1747	6426		809	4638	1005	3610
ZONE NO	BR05	6294					3112				
			542	2225	628	2894		259	1254	310	1284
ZONE NO	BR06	7750					4234				
			643	3223	774	3108		345	1871	423	1593
ZONE NO	BR07	5682					2533				
			567	2508	325	2280		252	1171	137	968
ZONE NO	BR08	12233					5584				
			1223	5668	667	4573		557	2664	294	2064
ZONE NO	BR09	12521					5891				
			1251	6166	636	4468		588	2919	297	2084
ZONE NO	BR10	5016					2378				
			501	2508	250	1755		237	1189	118	832
ZONE NO	BR11	9730					4612				
			973	4865	486	3405		461	2306	230	1614
ZONE NO	BR12	2085					983				
			208	1030	105	740		97	487	48	346
ZONE NO	BR13	5082					2959				
			409	2331	507	1831		237	1374	295	1050
ZONE NO	BR14	2					1				
			0	1	0	0		0	0	0	0

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR15	127					68				
			37	69	0	18		20	37	0	10
ZONE NO	BR16	394					216				
			118	216	0	59		64	113	0	32
ZONE NO	BR17	278					151				
			83	151	0	42		45	83	0	23
ZONE NO	BR18	36					18				
			10	19	0	5		5	9	0	2
ZONE NO	BR19	20					10				
			6	11	0	3		3	5	0	1
ZONE NO	BR20	98					54				
			29	53	0	14		16	29	0	9
ZONE NO	BR21	46					24				
			13	25	0	6		7	13	0	3
ZONE NO	BR22	47					24				
			13	25	0	6		7	13	0	3
ZONE NO	BR23	26					13				
			7	14	0	3		3	7	0	1
ZONE NO	BR24	83					43				
			24	45	0	12		12	23	0	6
ZONE NO	BR25	936					514				
			280	514	0	140		154	282	0	77
ZONE NO	BR26	32					17				
			9	17	0	4		5	9	0	2
ZONE NO	BR27	27					14				
			7	14	0	3		4	7	0	2
ZONE NO	BR28	1623					893				
			486	892	0	243		267	491	0	133

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR29	57					29				
			16	30	0	11		8	15	0	4
ZONE NO	BR30	2676					1473				
			803	1471	0	401		441	810	0	220
ZONE NO	BR31	8425					4643				
			2527	4633	0	1263		1392	2553	0	696
ZONE NO	BR32	2681					1475				
			804	1474	0	403		442	811	0	221
ZONE NO	BR33	1999					1098				
			599	1098	0	299		328	602	0	164
ZONE NO	BR34	932					512				
			279	512	0	139		153	281	0	76
ZONE NO	BR35	3583					1972				
			1074	1970	0	537		591	1085	0	295
ZONE NO	BR36	564					310				
			169	310	0	84		93	170	0	46
ZONE NO	BR37	530					292				
			161	295	0	80		88	162	0	44
ZONE NO	BR38	2455					1352				
			736	1349	0	368		405	743	0	202
ZONE NO	BR39	2496					1374				
			748	1372	0	374		412	755	0	206
ZONE NO	BR40	2744					1511				
			823	1509	0	411		453	831	0	226
ZONE NO	BR41	3162					1730				
			948	1739	0	474		519	951	0	259
ZONE NO	BR42	1513					822				
			453	831	0	226		246	452	0	123
ZONE NO	BR43	16347					9005				
			4901	8990	0	2454		2701	4952	0	1350
ZONE NO	BR44	2794					1538				
			838	1538	0	419		461	845	0	230
		187355	28512	90751	10797	57191	100526	15354	49459	5851	29763

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 1-2 NORMAL OCCUPANCY

BROWARD COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.56	1.25	1.56	1.56	1.56	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	0.25	0.25	0.25	0.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	25.00	25.00	25.00	25.00	25.00	0.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	8.00	10.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00	0.00
Friend	47.00	50.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	35.00	15.00	15.00	15.00	0.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	80.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,13
GROUP # 2: 7,8,9,10,11,12
GROUP # 3: 14,15,16,17,18,19,20,21,22
GROUP # 4: 23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44
GROUP # 6: NONE
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR15	128					68				
			37	69	0	19		20	37	0	10
ZONE NO	BR16	395					210				
			118	216	0	59		64	118	0	33
ZONE NO	BR17	280					153				
			83	151	0	43		45	83	0	23
ZONE NO	BR18	36					18				
			10	19	0	5		5	9	0	2
ZONE NO	BR19	20					10				
			6	11	0	3		3	5	0	1
ZONE NO	BR20	98					54				
			29	53	0	14		16	29	0	8
ZONE NO	BR21	46					24				
			13	25	0	6		7	13	0	3
ZONE NO	BR22	47					24				
			13	25	0	6		7	13	0	3
ZONE NO	BR23	27					13				
			7	14	0	3		3	7	0	1
ZONE NO	BR24	85					44				
			24	45	0	14		12	23	0	6
ZONE NO	BR25	937					514				
			280	514	0	140		154	282	0	77
ZONE NO	BR26	32					17				
			9	17	0	4		5	9	0	2
ZONE NO	BR27	28					15				
			7	14	0	4		4	7	0	2
ZONE NO	BR28	1624					894				
			486	892	0	244		267	491	0	133

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 1-2 NOVEMBER OCCUPANCY

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR01	9374					5170				
			773	3956	937	3705		420	2303	516	1929
ZONE NO	BR02	23013					12969				
			1882	10045	2301	8783		1046	5878	1296	4745
ZONE NO	BR03	17597					9747				
			1450	7477	1759	6908		791	4356	974	3623
ZONE NO	BR04	18787					10437				
			1545	8019	1877	7341		846	4675	1042	3869
ZONE NO	BR05	9220					3940				
			835	2518	921	4942		342	1337	393	1863
ZONE NO	BR06	9424					4708				
			809	3390	941	4280		392	1918	470	1924
ZONE NO	BR07	6918					2883				
			691	2630	449	3146		287	1206	172	1213
ZONE NO	BR08	13893					6053				
			1389	5834	833	5835		604	2711	341	2393
ZONE NO	BR09	12859					5986				
			1285	6202	670	4699		598	2929	307	2151
ZONE NO	BR10	5016					2378				
			501	2508	250	1755		237	1189	118	832
ZONE NO	BR11	9730					4612				
			973	4865	486	3405		461	2306	230	1614
ZONE NO	BR12	2133					996				
			212	1034	109	772		99	489	50	355
ZONE NO	BR13	5310					3023				
			432	2354	530	1991		243	1380	301	1095
ZONE NO	BR14	2					1				
			0	1	0	0		0	0	0	0

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR29	59					30				
			18	30	0	9		8	15	0	4
ZONE NO	BR30	2677					1473				
			803	1471	0	401		441	810	0	220
ZONE NO	BR31	8437					4644				
			2527	4633	0	1265		1392	2553	0	698
ZONE NO	BR32	2684					1475				
			804	1474	0	404		442	811	0	221
ZONE NO	BR33	2000					1096				
			599	1098	0	300		328	602	0	164
ZONE NO	BR34	933					512				
			279	512	0	139		153	281	0	78
ZONE NO	BR35	3585					1974				
			1074	1970	0	539		591	1085	0	298
ZONE NO	BR36	564					310				
			169	310	0	84		93	170	0	46
ZONE NO	BR37	539					296				
			161	295	0	80		88	162	0	44
ZONE NO	BR38	2456					1352				
			736	1349	0	369		405	743	0	202
ZONE NO	BR39	2497					1374				
			748	1372	0	374		412	755	0	206
ZONE NO	BR40	3744					1511				
			823	1509	0	411		453	831	0	226
ZONE NO	BR41	3163					1730				
			948	1739	0	474		519	951	0	259
ZONE NO	BR42	1514					822				
			453	831	0	227		246	452	0	123
ZONE NO	BR43	16349					9006				
			4903	9998	0	2453		2701	4953	0	1350
ZONE NO	BR44	2795					1538				
			838	1538	0	419		461	845	0	230
		200045	29778	92017	12083	66074	104114	15713	49818	6210	32370

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 1-2 NOVEMBER OCCUPANCY

BROWARD COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.56	1.25	1.56	1.56	1.56	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	0.25	0.25	0.25	0.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	62.00	62.00	62.00	62.00	62.00	0.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	8.00	10.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00	0.00
Friend	47.00	50.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	35.00	15.00	15.00	15.00	0.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	80.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,13
GROUP # 2: 7,8,9,10,11,12
GROUP # 3: 14,15,16,17,18,19,20,21,22
GROUP # 4: 23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44
GROUP # 6: NONE
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 3 NORMAL OCCUPANCY

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating vehicles	1	2	3	4
ZONE NO	BR01	8650					4965				
			700	3883	864	3198		395	2261	495	1785
ZONE NO	BR02	21770					12618				
			1758	9931	2177	7913		1013	5841	1261	4499
ZONE NO	BR03	16318					9385				
			1322	7349	1631	6013		755	4320	938	3370
ZONE NO	BR04	17481					10068				
			1415	7889	1747	6426		809	4638	1005	3610
ZONE NO	BR05	6294					3112				
			543	2225	628	2894		259	1254	310	1284
ZONE NO	BR06	7750					4234				
			642	3223	774	3108		345	1871	423	1593
ZONE NO	BR07	5682					2533				
			567	2506	325	2280		252	1171	137	968
ZONE NO	BR08	12233					5584				
			1223	5668	667	4573		557	2664	294	2064
ZONE NO	BR09	12521					5891				
			1251	6168	638	4462		588	2919	297	2084
ZONE NO	BR10	5016					2378				
			501	2508	250	1755		237	1189	118	832
ZONE NO	BR11	9730					4612				
			973	4865	486	3405		461	2306	230	1614
ZONE NO	BR12	2086					983				
			208	1030	105	740		97	487	48	346
ZONE NO	BR13	5082					2959				
			409	2331	507	1831		237	1374	295	1050
ZONE NO	BR14	1334					691				
			133	867	0	333		69	449	0	172

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR15	15504					7959				
			1551	9937	25	3985		795	5138	6	2017
ZONE NO	BR16	12502					6433				
			1249	8023	18	3208		642	4155	4	1628
ZONE NO	BR17	11750					5917				
			1174	7284	64	3228		590	3757	15	1550
ZONE NO	BR18	14605					7557				
			1459	9488	0	3653		755	4910	0	1889
ZONE NO	BR19	8116					4200				
			811	5275	0	2029		420	2730	0	1050
ZONE NO	BR20	9882					5117				
			988	6423	0	2470		511	3326	0	1279
ZONE NO	BR21	18819					9735				
			1881	12224	1	4710		973	6329	0	2435
ZONE NO	BR22	19329					9943				
			1932	12437	23	4935		993	6430	5	2510
ZONE NO	BR23	53					27				
			15	28	0	7		8	14	0	4
ZONE NO	BR24	169					87				
			49	91	0	25		25	47	0	12
ZONE NO	BR25	1007					550				
			301	553	0	150		165	302	0	82
ZONE NO	BR26	64					34				
			19	35	0	9		10	18	0	5
ZONE NO	BR27	56					28				
			16	29	0	5		8	15	0	4
ZONE NO	BR28	1686					924				
			505	926	0	253		277	508	0	138

1 = Public Shelter
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3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR29	114					59				
			33	61	0	17		17	31	0	8
ZONE NO	BR30	2774					1524				
			833	1525	0	416		457	838	0	228
ZONE NO	BR31	8538					4697				
			2558	4690	0	1280		1408	2583	0	704
ZONE NO	BR32	2785					1529				
			834	1530	0	418		458	840	0	229
ZONE NO	BR33	2166					1183				
			649	1190	0	325		354	650	0	177
ZONE NO	BR34	996					545				
			298	547	0	149		163	299	0	81
ZONE NO	BR35	3660					2014				
			1097	2011	0	549		603	1107	0	301
ZONE NO	BR36	616					338				
			184	338	0	92		100	184	0	50
ZONE NO	BR37	562					309				
			168	309	0	84		92	169	0	46
ZONE NO	BR38	2511					1381				
			753	1380	0	377		414	759	0	207
ZONE NO	BR39	2595					1424				
			778	1426	0	389		427	783	0	213
ZONE NO	BR40	2804					1543				
			841	1542	0	420		462	848	0	231
ZONE NO	BR41	3559					1936				
			1067	1956	0	533		580	1064	0	290
ZONE NO	BR42	1869					1006				
			560	1027	0	281		301	553	0	150
ZONE NO	BR43	16635					9154				
			4989	9147	0	2495		2745	5034	0	1372
ZONE NO	BR44	2905					1594				
			871	1597	0	435		478	876	0	239
		300568	40105	163468	10927	85963	158756	21309	87058	5881	44400

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 3 NORMAL OCCUPANCY

BROWARD COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.56	1.25	1.56	1.56	1.56	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	25.00	25.00	25.00	25.00	25.00	0.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	8.00	10.00	10.00	30.00	30.00	0.00	0.00	0.00	0.00	0.00
Friend	47.00	50.00	65.00	55.00	55.00	0.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	35.00	25.00	15.00	15.00	0.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	80.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,13
GROUP # 2: 7,8,9,10,11,12
GROUP # 3: 14,15,16,17,18,19,20,21,22
GROUP # 4: 23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44
GROUP # 6: NONE
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 3 NOVEMBER OCCUPANCY

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR01	9374					5170				
			773	3956	937	3705		420	2302	516	1929
ZONE NO	BR02	23013					12969				
			1882	10045	2301	8783		1048	5876	1296	4745
ZONE NO	BR03	17597					9747				
			1450	7477	1759	6908		791	4356	974	3623
ZONE NO	BR04	18787					10437				
			1545	8019	1877	7341		846	4675	1042	3869
ZONE NO	BR05	9220					3940				
			835	2518	921	4942		342	1337	393	1863
ZONE NO	BR06	9424					4708				
			809	3390	941	4280		392	1918	470	1924
ZONE NO	BR07	6918					2883				
			691	2630	449	3146		287	1206	172	1213
ZONE NO	BR08	13893					6053				
			1389	5834	833	5835		604	2711	341	2393
ZONE NO	BR09	12859					5986				
			1285	6202	670	4699		598	2929	307	2151
ZONE NO	BR10	5016					2378				
			501	2508	250	1755		237	1189	118	832
ZONE NO	BR11	9730					4612				
			973	4865	486	3405		461	2306	230	1614
ZONE NO	BR12	2133					996				
			212	1034	109	772		99	489	50	355
ZONE NO	BR13	5310					3023				
			432	2354	530	1991		243	1380	301	1095
ZONE NO	BR14	1334					691				
			133	867	0	333		69	449	0	172

1 = Public Shelter
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4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR15	15880					8052				
			1587	9974	62	4253		804	5147	15	2083
ZONE NO	BR16	12776					6501				
			1277	8051	46	3401		649	4162	11	1675
ZONE NO	BR17	12700					6152				
			1269	7379	159	3891		614	3781	39	1714
ZONE NO	BR18	14615					7559				
			1460	9489	1	3661		755	4910	0	1890
ZONE NO	BR19	8116					4200				
			811	5275	0	2029		420	2730	0	1050
ZONE NO	BR20	9882					5117				
			988	6423	0	2470		511	3326	0	1279
ZONE NO	BR21	18838					9740				
			1883	12226	3	4723		973	6325	0	2438
ZONE NO	BR22	19667					10025				
			1966	12471	56	5172		1002	6439	14	2569
ZONE NO	BR23	54					28				
			15	28	0	8		8	14	0	4
ZONE NO	BR24	173					88				
			49	91	0	28		25	47	0	13
ZONE NO	BR25	1008					551				
			301	553	0	151		165	302	0	82
ZONE NO	BR26	65					34				
			19	35	0	9		10	18	0	5
ZONE NO	BR27	59					29				
			16	29	0	11		8	15	0	4
ZONE NO	BR28	1688					925				
			505	926	0	255		277	508	0	138

1 = Public Shelter
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3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR29	117					59				
			33	61	0	19		17	31	0	8
ZONE NO	BR30	2775					1524				
			832	1525	0	416		457	838	0	228
ZONE NO	BR31	8534					4698				
			2558	4690	0	1283		1408	2582	0	705
ZONE NO	BR32	2789					1530				
			834	1530	0	421		458	840	0	230
ZONE NO	BR33	2168					1183				
			649	1190	0	326		354	650	0	177
ZONE NO	BR34	996					545				
			298	547	0	149		163	299	0	81
ZONE NO	BR35	3664					2014				
			1097	2011	0	552		603	1107	0	302
ZONE NO	BR36	616					336				
			184	338	0	92		100	184	0	50
ZONE NO	BR37	563					309				
			168	309	0	84		92	169	0	46
ZONE NO	BR38	2514					1382				
			753	1380	0	378		414	759	0	207
ZONE NO	BR39	2596					1424				
			778	1426	0	390		427	783	0	213
ZONE NO	BR40	2805					1543				
			841	1542	0	420		462	848	0	231
ZONE NO	BR41	3559					1938				
			1067	1956	0	533		580	1064	0	290
ZONE NO	BR42	1872					1007				
			560	1027	0	282		301	553	0	150
ZONE NO	BR43	16639					9155				
			4989	9147	0	2498		2745	5034	0	1373
ZONE NO	BR44	2906					1595				
			871	1597	0	436		478	876	0	239
		315244	41568	X164925	12390	96235	162836	21717	87464	6289	47252

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 3 NOVEMBER OCCUPANCY

BROWARD COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.56	1.25	1.56	1.56	1.56	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	62.00	62.00	62.00	62.00	62.00	0.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	8.00	10.00	10.00	30.00	30.00	0.00	0.00	0.00	0.00	0.00
Friend	47.00	50.00	65.00	55.00	55.00	0.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	35.00	25.00	15.00	15.00	0.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	80.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,13
GROUP # 2: 7,8,9,10,11,12
GROUP # 3: 14,15,16,17,18,19,20,21,22
GROUP # 4: 23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44
GROUP # 6: NONE
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 4-5 NORMAL OCCUPANCY

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR01	8650					4965				
			709	2659	864	4422		399	1557	495	2509
ZONE NO	BR02	21770					12618				
			1759	6781	2177	11053		1013	3984	1261	6356
ZONE NO	BR03	16318					9385				
			1323	5031	1631	8331		755	2949	939	4741
ZONE NO	BR04	17481					10068				
			1415	5399	1747	8916		809	3165	1005	5083
ZONE NO	BR05	6294					3112				
			542	1578	628	3542		259	871	310	1667
ZONE NO	BR06	7750					4234				
			643	2230	774	4101		345	1284	423	2181
ZONE NO	BR07	5682					2533				
			567	2021	325	2764		252	941	137	1198
ZONE NO	BR08	12233					5584				
			1223	4556	667	5784		557	2137	294	2591
ZONE NO	BR09	12521					5891				
			1251	4938	636	5691		588	2336	297	2666
ZONE NO	BR10	5016					2378				
			501	2006	250	2257		237	951	118	1070
ZONE NO	BR11	9730					4612				
			973	3892	486	4378		461	1844	230	2075
ZONE NO	BR12	2086					983				
			208	824	105	946		97	389	48	444
ZONE NO	BR13	5082					2959				
			409	1591	507	2571		237	936	295	1487
ZONE NO	BR14	1334					691				
			133	667	0	533		69	345	0	276

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR15	15504					7959				
			1550	7650	25	6277		795	3954	6	3201
ZONE NO	BR16	12502					6433				
			1249	6178	18	5055		642	3197	4	2586
ZONE NO	BR17	11750					5917				
			1174	5613	64	4892		590	2894	15	2414
ZONE NO	BR18	14605					7557				
			1459	7299	0	5843		755	3777	0	3023
ZONE NO	BR19	8116					4200				
			811	4058	0	3246		420	2100	0	1680
ZONE NO	BR20	9882					5117				
			988	4941	0	3952		511	2558	0	2046
ZONE NO	BR21	18819					9735				
			1881	9404	1	7531		973	4866	0	3894
ZONE NO	BR22	19329					9942				
			1932	9572	22	7800		993	4947	5	3993
ZONE NO	BR23	10894					5585				
			1623	6971	19	2277		834	3602	4	1141
ZONE NO	BR24	34037					17470				
			5078	21829	53	7074		2613	11282	13	3559
ZONE NO	BR25	29062					15025				
			4350	18797	16	5895		2251	9742	4	3025
ZONE NO	BR26	13248					6837				
			1983	8571	7	2685		1023	4433	1	1375
ZONE NO	BR27	11260					5725				
			1669	7110	37	2440		853	3669	9	1191
ZONE NO	BR28	26414					13629				
			3943	16975	34	5456		2039	8810	8	2768

1 = Public Shelter
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3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR29	230					118				
			79	101	0	47		40	53	0	23
ZONE NO	BR30	2971					1625				
			1039	1336	0	594		568	731	0	325
ZONE NO	BR31	8741					4805				
			3057	3931	0	1750		1681	2161	0	960
ZONE NO	BR32	2994					1635				
			1045	1344	0	600		571	735	0	326
ZONE NO	BR33	2495					1355				
			873	1123	0	501		473	609	0	270
ZONE NO	BR34	1122					610				
			392	504	0	224		213	274	0	122
ZONE NO	BR35	3817					2093				
			1334	1715	0	765		732	941	0	418
ZONE NO	BR36	718					389				
			251	323	0	143		136	175	0	77
ZONE NO	BR37	613					334				
			214	275	0	122		116	150	0	66
ZONE NO	BR38	2625					1440				
			917	1179	0	526		503	647	0	287
ZONE NO	BR39	2788					1523				
			975	1253	0	558		533	685	0	304
ZONE NO	BR40	2929					1606				
			1024	1317	0	585		562	722	0	321
ZONE NO	BR41	4353					2346				
			1523	1958	0	870		821	1055	0	469
ZONE NO	BR42	2585					1377				
			903	1161	0	518		481	619	0	275
ZONE NO	BR43	17208					9450				
			6020	7740	0	3443		3307	4252	0	1889
ZONE NO	BR44	3124					1707				
			1092	1404	0	625		597	768	0	341
		426682	62072	%205808	11093	%147583	223559	32704	%108096	5920	76713

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 4-5 NORMAL OCCUPANCY

BROWARD COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of People Per Perm Unit	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.56	1.25	1.56	1.56	1.56	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	100.00	1.00	0.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	25.00	25.00	25.00	25.00	25.00	0.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	8.00	10.00	10.00	15.00	35.00	0.00	0.00	0.00	0.00	0.00
Friend	32.00	40.00	50.00	65.00	45.00	0.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	45.00	40.00	20.00	20.00	0.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	80.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,13
GROUP # 2: 7,8,9,10,11,12
GROUP # 3: 14,15,16,17,18,19,20,21,22
GROUP # 4: 23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44
GROUP # 6: NONE
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 4-5 NOVEMBER OCCUPANCY

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR01	9374					5170				
			773	2732	937	4929		420	1578	516	2656
ZONE NO	BR02	23013					12969				
			1882	6905	2301	11923		1048	4019	1296	6602
ZONE NO	BR03	17597					9747				
			1450	5159	1759	9227		791	2985	974	4994
ZONE NO	BR04	18787					10437				
			1545	5529	1877	9831		846	3202	1042	5342
ZONE NO	BR05	9220					3940				
			835	1871	921	5590		342	954	393	2246
ZONE NO	BR06	9424					4708				
			809	2397	941	5273		392	1331	470	2512
ZONE NO	BR07	6918					2883				
			691	2145	449	3630		287	976	172	1443
ZONE NO	BR08	13893					6053				
			1389	4722	833	6946		604	2184	341	2920
ZONE NO	BR09	12859					5986				
			1285	4972	670	5928		598	2346	307	2733
ZONE NO	BR10	5016					2378				
			501	2006	250	2257		237	951	118	1070
ZONE NO	BR11	9730					4612				
			973	3892	486	4378		461	1844	230	2075
ZONE NO	BR12	2133					996				
			212	828	109	978		99	391	50	453
ZONE NO	BR13	5310					3023				
			432	1614	530	2731		243	942	301	1532
ZONE NO	BR14	1334					691				
			133	667	0	533		69	345	0	276

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR15	15880					8052				
			1587	7687	62	6540		804	3963	15	3267
ZONE NO	BR16	12776					6501				
			1277	6204	46	5248		649	3204	11	2633
ZONE NO	BR17	12700					6152				
			1269	5713	159	5557		614	2918	39	2578
ZONE NO	BR18	14615					7559				
			1460	7300	1	5851		755	3777	0	3024
ZONE NO	BR19	8116					4200				
			811	4058	0	3246		420	2100	0	1680
ZONE NO	BR20	9882					5117				
			988	4941	0	3952		511	2558	0	2046
ZONE NO	BR21	18838					9740				
			1883	9406	3	7544		973	4866	0	3897
ZONE NO	BR22	19667					10025				
			1966	9606	56	8037		1002	4956	14	4052
ZONE NO	BR23	11188					5658				
			1653	7001	49	2483		842	3610	12	1192
ZONE NO	BR24	34829					17666				
			5157	21908	132	7628		2632	11301	32	3696
ZONE NO	BR25	29311					15086				
			4375	18822	41	6070		2257	9748	10	3068
ZONE NO	BR26	13354					6863				
			1993	8581	17	2759		1026	4436	4	1393
ZONE NO	BR27	11819					5864				
			1725	7166	93	2831		867	3683	23	1288
ZONE NO	BR28	26932					13757				
			3995	17027	86	5819		2052	8823	21	2858

1 = Public Shelter
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3 = Hotel/Motel
4 = Out of County

BROWARD COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	BR29	237					120				
			80	102	1	52		40	52	0	24
ZONE NO	BR30	2972					1626				
			1039	1336	0	595		568	731	0	325
ZONE NO	BR31	8748					4807				
			3058	3932	1	1755		1681	2161	0	962
ZONE NO	BR32	3002					1637				
			1046	1345	1	606		571	735	0	328
ZONE NO	BR33	2504					1356				
			873	1123	0	504		473	609	0	271
ZONE NO	BR34	1123					610				
			392	504	0	224		213	274	0	122
ZONE NO	BR35	3824					2095				
			1335	1716	1	770		732	941	0	420
ZONE NO	BR36	719					389				
			251	323	0	143		136	175	0	77
ZONE NO	BR37	614					335				
			214	275	0	123		116	150	0	66
ZONE NO	BR38	2629					1441				
			917	1179	0	529		503	647	0	288
ZONE NO	BR39	2790					1524				
			975	1253	0	559		533	685	0	304
ZONE NO	BR40	2930					1606				
			1024	1317	0	586		562	722	0	321
ZONE NO	BR41	4355					2347				
			1523	1958	0	871		821	1055	0	469
ZONE NO	BR42	2589					1378				
			903	1161	0	521		481	619	0	276
ZONE NO	BR43	17216					9452				
			6021	7741	1	3449		3307	4252	0	1891
ZONE NO	BR44	3126					1708				
			1092	1404	0	626		597	768	0	341
		443893	63792	%207528	12813	%159632	228266	33175	%108567	6391	

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 4-5 NOVEMBER OCCUPANCY

BROWARD COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.11	2.11	2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.98	1.98	1.98	1.98	1.98	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.56	1.25	1.56	1.56	1.56	0.00	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	100.00	1.00	0.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	62.00	62.00	62.00	62.00	62.00	0.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	8.00	10.00	10.00	15.00	35.00	0.00	0.00	0.00	0.00	0.00
Friend	32.00	40.00	50.00	65.00	45.00	0.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	45.00	40.00	20.00	20.00	0.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	80.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,13
GROUP # 2: 7,8,9,10,11,12
GROUP # 3: 14,15,16,17,18,19,20,21,22
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GROUP # 5: 29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44
GROUP # 6: NONE
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

TRANSPORTATION ANALYSIS

DADE COUNTY

TRANSPORTATION ANALYSIS CHAPTER

(Dade Version)

Lower Southeast Florida Hurricane Evacuation Study
Technical Data Report

Prepared by

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Prepared for

Department of the Army
Jacksonville District, Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

JANUARY 1991

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Dade County

During a hurricane evacuation effort, it is widely recognized that a large number of vehicles have to be moved across a road network in a relatively short period of time. The number of vehicles and evacuees becomes particularly significant for an area such as Dade County where major urban areas and vulnerable permanent and seasonal communities are located. The magnitude of evacuating vehicles varies depending upon the intensity of the hurricane, presence of seasonal residents and certain behavioral response characteristics of the vulnerable population.

Vehicles enter the road network at different times depending on the evacuee's response relative to an evacuation order or advisory. Conversely, vehicles leave the road network depending on both the planned destinations of evacuees and the availability of acceptable destinations such as public shelters, hotel/motel units and friends' or relatives' homes in non-flooded areas. Vehicles move across the road network from trip origin to destination at a speed dependent on the traffic loadings on various roadway segments and the ability of the segments to handle a certain volume of vehicles each hour.

The overall goals of the transportation analysis performed for the Dade portion of the Lower Southeast Florida Hurricane Evacuation Study were to estimate clearance times (the time it takes to clear a county's roadways of all evacuating vehicles), to define the evacuation road network, and to look at general traffic control issues that could affect traffic flow along critical roadway segments. Clearance time is a value resulting from transportation engineering analysis performed under a specific set of assumptions. It must be coupled with pre-landfall hazards data to determine when a strong evacuation advisory must be issued to allow all evacuees time to reach safe shelter before the arrival of sustained tropical storm winds. Factors that influence clearance time must be studied intensively to determine which factors have the strongest influence.

The transportation analysis task initially identified the kinds of traffic movements associated with a hurricane evacuation that must be considered in the development of clearance times. Basic assumptions for the transportation analysis were then developed related to storm scenarios, population-at-risk, behavioral and socioeconomic characteristics, the roadway system and traffic control. A transportation modeling methodology and a roadway system representation were developed to facilitate model application and development of clearance times. General information and data related to the transportation analysis are presented in summary form in the Technical Data Report. A Transportation Model Support Document will be available through the Jacksonville District Corps of Engineers and will include a detailed account of all transportation modeling activities and zone by zone data listings for the county.

EVACUATION TRAVEL PATTERNS

Traffic movements associated with hurricane evacuation have been identified for the purposes of this analysis by five general patterns:

A. In County Origins to In County Destinations

Trips made from storm surge vulnerable areas, and mobile home units in the county to destinations within the same county, such as public shelters, hotel and motel units, and friends or relatives outside the storm surge vulnerable areas.

B. In County Origins to Out-of-County Destinations

Trips made as in category A that originate in the county but have destinations in other counties of the region or outside the region entirely.

C. Out of County Origins to In County Destinations

Trips made as in category A that enter the county from other counties in the region.

D. Out of County Origins to Out-of-County Destinations

Trips passing through the county while traveling from another county in the study area to either another county or outside the region entirely. This travel pattern is particularly significant due to the effects of Monroe County traffic on the Homestead Extension of the Florida Turnpike passing through Dade County during an evacuation.

E. Background Traffic

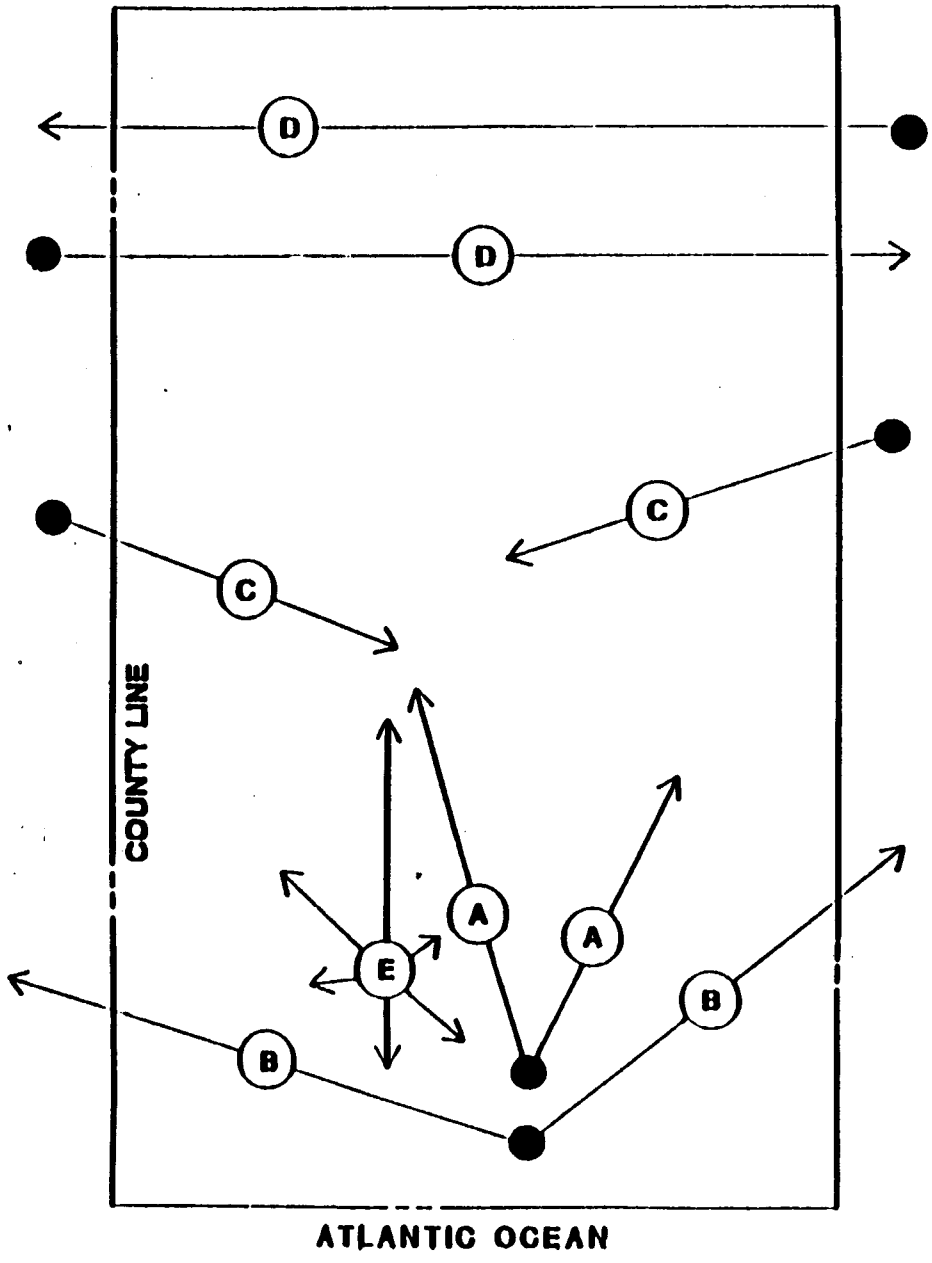
Trips made by persons preparing for the arrival of hurricane conditions; these trips may be shopping trips to gather supplies and/or trips from work to home to assist the family in evacuation. This traffic can also include transit vehicles (vans/buses) used to pick up evacuees without personal transportation.

Figure 6-1 graphically depicts these traffic movement patterns associated with hurricane evacuation situations in Dade County. It is important to recognize that three of the five defined patterns involve traffic movement patterns generated outside of the county's boundaries.

TRANSPORTATION ANALYSIS INPUT ASSUMPTIONS

Since all hurricanes differ from one another in some respect, it becomes necessary to set forth clear assumptions about storm characteristics and evacuees' expected response before transportation modeling can begin. Not only does a storm vary in its track, intensity and size, but also in the way it is perceived by residents in potentially vulnerable areas. These factors cause a wide variance in the behavior of the vulnerable population. Even the time of day at which a storm makes landfall influences the time parameters of an evacuation response.

The transportation analysis results in clearance times based on a set of assumed conditions and behavioral responses. It is likely that an actual storm will differ from a simulated storm for which clearance times are calculated in this report. Therefore, a sensitivity analysis was performed during the transportation modeling. Those variables having the greatest influence on clearance time were



EVACUATION TRAVEL PATTERNS

- (A) In-County Origins To In-County Destinations
- (B) In-County Origins To Out-Of-County Destinations
- (C) Out-Of-County Origins To In-County Destinations
- (D) Out-Of-County Origins To Out-Of-County Destinations
- (E) Background Traffic

Figure 6-1

identified and then varied to establish the logical range within which the actual input assumption values might fall.

Key assumptions guiding the transportation analysis are grouped into five areas.

1. Population Data
2. Storm Scenarios
3. Evacuation Zones
4. Behavioral Characteristics of the Evacuating Population
5. Roadway Network and Traffic Control Assumptions

These five areas and their assumed parameters are described in the following paragraphs. Those parameters which were varied for sensitivity analysis are noted.

Population Data

A 1991 data base for Dade County was interpolated using 1986 base year and 2010 future year data bases available through the Metropolitan Dade County Planning Department. This source of data by TAZ provided a base for permanent population parameters on a sub-county basis. Since data are regularly updated for these units, their use provides a means to facilitate updating of the evacuation study in the future.

Seasonal and permanent dwelling unit data assembled by PBS&J included the following resources:

* Traffic Analysis Zonal Data Bases - Dade County MPO Staff
* U.S. Census Bureau - 1980 Population and Housing Units.
* 1989 Florida Statistical Abstract
* Dade County mobile home data (provided by Metro-Dade Office of Emergency Management)

The assumed 1991 permanent population for the hurricane study was 1,900,000 in Dade County. The associated number of permanent, mobile home, and hotel/motel/seasonal dwelling units for the county was 750,000, 16,900, and 62,400 units respectively. Estimates of vehicle ownership by sub-area were crucial to translating hurricane vulnerable housing units to vehicle demand for roadways.

Storm Scenarios

The hazards analysis identified those storm tracks causing the worst possible and probable storm surge in Dade County for each of five hurricane intensity categories (corresponding to the Saffir-Simpson scale). When five storm intensities are factored by several varying behavioral parameters, the number of hypothetical hurricane situations can quickly reach 100 or more. Calculation of clearance times for this many storm situations would be cumbersome and unusable by local emergency preparedness officials and would be inappropriate given the relative level of accuracy of hurricane storm forecasting. Storm forecasting for the period 12 to 24 hours prior to eye landfall is generally not precise enough to allow for more than 2 or 3 storm scenarios (grouping by intensity) per county.

Traffic analysis zones were compared with storm surge limits corresponding to the five hurricane categories. This procedure identified where major differences in storm surge limits and number of vulnerable population exist relative to each progressive step in hurricane intensity. The storm scenarios developed in the transportation analysis for Dade County are as follows:

Storm Scenarios	Saffir Simpson Category
A	Category 1
B	Category 2-3
C	Category 4-5

Evacuation Zones

Through the SLOSH model and hazards analysis, those areas which will receive hurricane storm surge were identified and graphically shown on the storm surge atlases provided by the State of Florida. This information became one of the key inputs to the transportation analysis. Those residents who must evacuate as

well as those residents who should not necessarily evacuate were defined.

Within the transportation analysis it was assumed that persons living in areas flooded by storm surge should be evacuated. This evacuee group included permanent residents living in single-family, multi-family, or mobile home units, as well as tourists staying in hotel/motel seasonal units located in storm surge vulnerable areas. In addition, mobile home residents living outside the hurricane flooded areas of each county were assumed to evacuate due to high wind vulnerability.

Having established those persons who should evacuate during a particular storm situation, it was then necessary to develop a series of zones to geographically locate and quantify the vulnerable population. Evacuation zones also provide a base to model traffic movements from one geographic area to another. A series of zones was established based on the following factors:

* Zones should relate to current Dade County evacuation areas.
* Zones should relate to expected surge flooding limits (based on Maximum Envelope of Water - MEOWs) for each storm scenario.
* Zones should relate well to traffic analysis zone, census, enumeration district or other data base unit.
* Zones should be set up, if possible, for ease of use in issuing an evacuation order or advisory.
* Zonal boundaries should include identifiable natural features, roadways, landmarks, etc.
* Small "pocket" zones that would be isolated by surrounding surge should be avoided.
* Zones should be able to be served by major evacuation routes.
* Zones must allow for appropriate transportation modeling.

For Dade County 50 zones were set-up. The first 7 zones cover the Category 1 surge area. The next twelve zones (zones 8-19) cover the Category 2-3 additional surge area. Zones 20 through 28 cover the Category 4-5 additional surge area. The remaining zones 29 through 50 cover the "wind-only" vulnerable area. Appendix A to the Technical Data Report, illustrates the evacuation zones established in Dade County for the transportation analysis.

Behavioral Assumptions

Recognizing that the future evacuation of an endangered population due to a hurricane approaching the Lower Southeast Florida study area involves the coordinated action of thousands of individuals, the Jacksonville District Corps hired Hazards Management Group to gather detailed information through a behavioral analysis pertaining to the tendencies and intended choices of the evacuation population.

PBS&J reviewed these data to derive the best assumptions possible for the transportation analysis. Specifically, for transportation purposes, the following behavioral aspects were addressed:

* Occupancy of hotel/motel units
* Participation rates
* Evacuation rates
* Destination desires
* Vehicle usage

As a hurricane approaches the study area, the number of tourists who may be required to evacuate along with the permanent residents could be significant. For the transportation analysis, two levels of seasonal occupancy were tested in Dade County (45% and 85% occupancy levels of identified seasonal units). Seasonal units identified for this study were predominantly hotel/motel units.

Another important behavioral aspect is that of participation rates. Participation rates of those residing in surge flooded zones generally varies between 30 to 90 percent depending on a zone's proximity to the waterfront or coastline. Generally, a 90 to 100 percent participation by those evacuees living in mobile homes outside the surge flooded areas can be assumed. However, for the Dade study area local officials felt it would be best to base the clearance time calculations on 100% participation by surge vulnerable residents and mobile home residents. This planning assumption proved to be prudent in other study areas such as South Carolina during the Hugo situation. In addition, a small percentage (½ to

2% depending on storm intensity) of the theoretical non-vulnerable population was assumed to evacuate their dwelling units in the county. The Transportation Model Support Document provides a listing of all participation rates assumed by zone by storm scenario for the county.

One of the most critical behavioral aspects that must be considered for the transportation analysis is the evacuation rate of the evacuating population. Behavioral data from research of past hurricane evacuations show that mobilization and actual departures of the evacuating population occur over a period of many hours and sometimes several days. For the Lower Southeast Florida study, clearance times were tested for three evacuation rates represented by different behavioral response curves. Behavioral response curves describing mobilization by the vulnerable population define the rate at which evacuating vehicles load onto the evacuation street network for each hourly interval relative to an evacuation order or strong advisory. The percentage of evacuees leaving dwelling units is then available for the calculations relating to traffic loadings at critical links along the evacuation network. The behavioral response curves shown in Figure 6-2 range from rapid response to slow response and are representations of possible mobilization times that might be experienced in a future hurricane evacuation situation. For sensitivity analysis, the mobilization/traffic loading time was varied between three hours and nine hours.

The percentage of evacuees assumed to go to one of four general destination types was another important behavioral input to the transportation analysis. Evacuee destination percentages were discussed with local disaster preparedness officials after careful review of information available in past behavioral research. Figures were developed for the expected percent of evacuees going to public shelters, hotel/motel units, the home of a friend or relative, or out of the county entirely. Destination percentages were varied for each evacuation zone in the county depending on category of risk (distance from coastline) or special characteristics of a zone such as high number of substandard housing units or low income residents. Specific assumptions for each scenario and evacuation zone are provided in the Transportation Model Support Document.

A final behavioral assumption refers to vehicle usage and the percent of households expected to pull a trailer or recreational vehicle during an evacuation. Vehicle usage percentages refer to the percent of vehicles available at the home

BEHAVIORAL CUMULATIVE EVACUATION CURVES

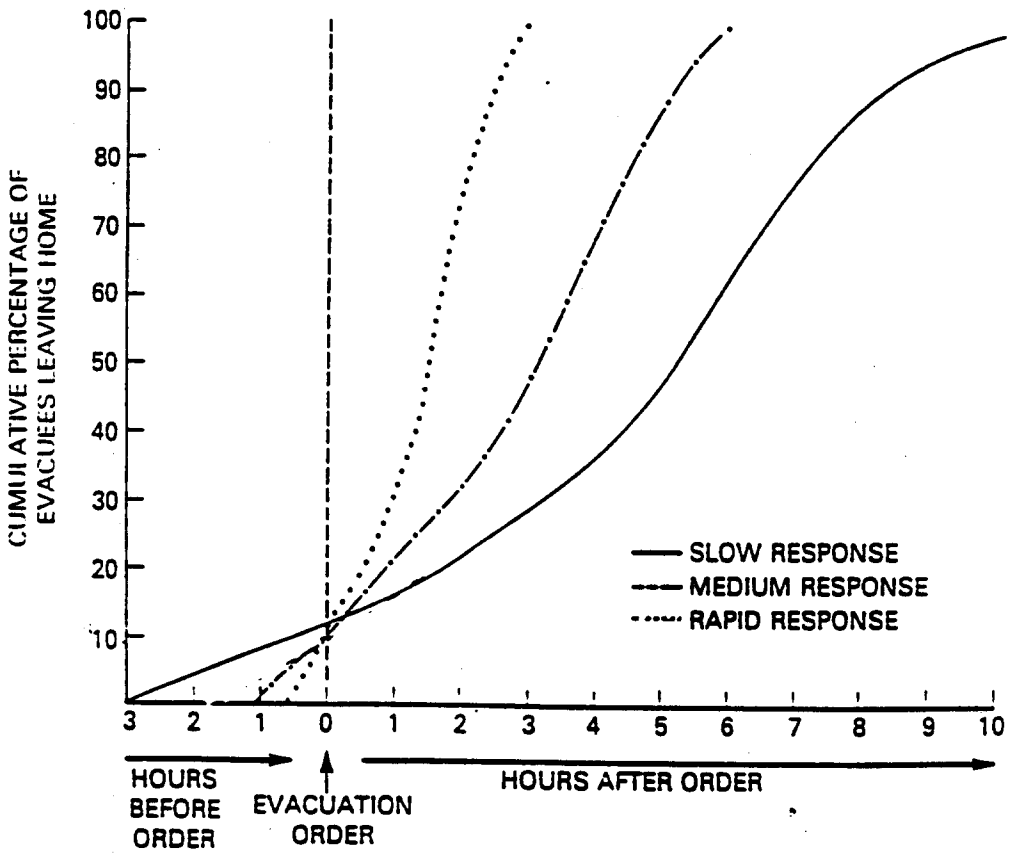


Figure 6-2

origin that are assumed to be used in the evacuation. Vehicle usage percentages were approximately 65% to 75% (depending on distance from the coastline) for the Lower Southeast Florida study transportation analysis. The percent of households expected to pull a boat, trailer or RV was approximately 1-5 percent in the immediate coastal area zones.

Roadway Network and Traffic Control Assumptions

A final group of assumptions used for input to the transportation analysis related to the roadway system chosen for the evacuation network and traffic control measures selected for traffic movement. Although the assumptions developed for the transportation analysis are general, the efforts at state, county and municipal levels regarding traffic control and roadway selection must be quite detailed. Detailed manpower allocations to major intersections, interchanges, and bridges involve extensive coordination among local and state officials. This study does not presume to replace those efforts, but seeks to quantify the time elements within which such manpower would operate.

In choosing roadways to be used for an evacuation network, an effort is made to include street facilities with sufficient elevations, little or no adjacent tree coverage, substantial shoulder width and surface, and roadways already contained in existing hurricane evacuation plans. Another objective is to include east-west arterials and bridge combinations that would provide the smoothest (least disjointed) possible traffic flow.

In order to determine the routing of evacuation traffic a representation of the roadway system was developed. A traditional "link-node" system was developed to identify roadway sections. Nodes are used to identify the intersection of two roadways or changes in roadway characteristics. Links are the roadway segments as defined by the nodes when connected. Each link is identified by a letter designation.

Once the links and nodes for the evacuation routes were identified, roadway characteristics were specified for each link. The characteristics of each link were defined by the following features.

* Number of travel lanes

* Type of facility

Appendix A to the Technical Data Report illustrates the roadway system representations (evacuation networks) for each county in the study area. The significance of link node segments and zone connectors (dashed lines) is explained in the Transportation Model Support Document. The figures consist of base maps showing all the major streets in the study area with identification of the nodes and centroid connectors in color. Detailed roadway link information is contained in the Transportation Model Support Document.

An important assumption for the transportation modeling was that all drawbriges would be locked down and open to vehicular traffic during a Hurricane Warning period. U.S. Coast Guard regulation 33-117.1(c) may give Civil Defense authorities the ability to implement this procedure. At the present time, request for closure prior to a major disaster occurring (and prior to the warning period) must be directed to the Coast Guard. The Coast Guard, however, has the capability of acting on these requests immediately. It is essential that appropriate bridge regulations be interpreted and implemented to allow for immediate response to an evacuation order. It may be prudent in some areas for boat owners to find safe harbor prior to or during a Hurricane Watch period. The lives of citizens evacuating in vehicles could be at risk if bridges are not allowed to operate at near full capacity during a Hurricane Warning. Bridge openings obviously result in less than full hourly capacity for vehicular movement.

It was assumed that special manpower (state police, local policemen, sheriffs, deputies), will be assigned to critical intersections in the study area. This would allow for smoother traffic flow and would allow east-west traffic movements more intersection "green time." The transportation modeling task also assumes that provisions would be made for removal of vehicles in distress during the evacuation. This may require that agreements with tow-truck operators be worked out in local planning efforts. Tow trucks could possibly be stationed at critical bridge segments and other roadway locations.

Assumptions concerning the road network are that the evacuation of all vehicles will occur prior to the arrival of sustained tropical storm winds (39 mph) and storm surge inundation. Due to the vulnerability of some local roadways to rainfall flooding, some segments may become impassable before the arrival of

hurricane related hazards such as storm surge and gale force winds.

In summary, data inputs to the transportation analysis can be classified into one of four categories:

* Hazards Data
* Socioeconomic Data
* Behavioral Data
* Roadway Network

Table 6-1 provides a listing of each major data input for each of the four categories.

OVERVIEW OF TRANSPORTATION MODELING METHODOLOGY

The work tasks involved in performing the transportation analysis are illustrated in Figure 6-3. In addition to the front end development of population data, evacuation zones, and scenarios, the diagram provides the transportation modeling steps in the upper right hand box.

The transportation modeling methodology developed and employed for the Lower Southeast Florida Study Area involved a number of manual and microcomputer techniques. The methodology, while very technical, was designed to be consistent with the accuracy level of the modeling inputs and assumptions. The methodology is unique in that it is sensitive to the key behavioral aspects of evacuees.

The Transportation Model Support Document specifies and explains the steps carried out in the transportation modeling at a detailed technical level. In summary, the modeling methodology involved seven major steps. These steps are briefly described below:

1. Evacuation Zonal Data Development - Data by traffic analysis zone (TAZ) were stratified by evacuation zone. Numbers of permanent residential dwelling units, mobile homes, and tourist units were compiled by zone and formatted for input into trip generation.

TABLE 6-1

Transportation Analysis Data Inputs

Hazards Data

* Land Areas Flooded for each Category Hurricane
* Public Shelter Useability by Hurricane Category
* Time of Arrival of Gale Force Winds/Roadway Inundation

Behavioral Data

* Rapidity of Response
* Participation Rates
* Destination Percentages
* Vehicle Usage
* Percent Pulling Trailer/Boat
* Presence of Tourists

Socioeconomic Data

* Housing Unit Data
* People Per Housing Unit
* Vehicles Per Housing Unit
* Occupancy Information

Roadway Network

* Number of Lanes by Link
* Facility Types by Link (function of roadway)
* Drawbridge Operations
* Traffic Count Data
* Elevation - "Low Spots"
* Critical Links/Intersections Capacity Data

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WORK FLOW DIAGRAM

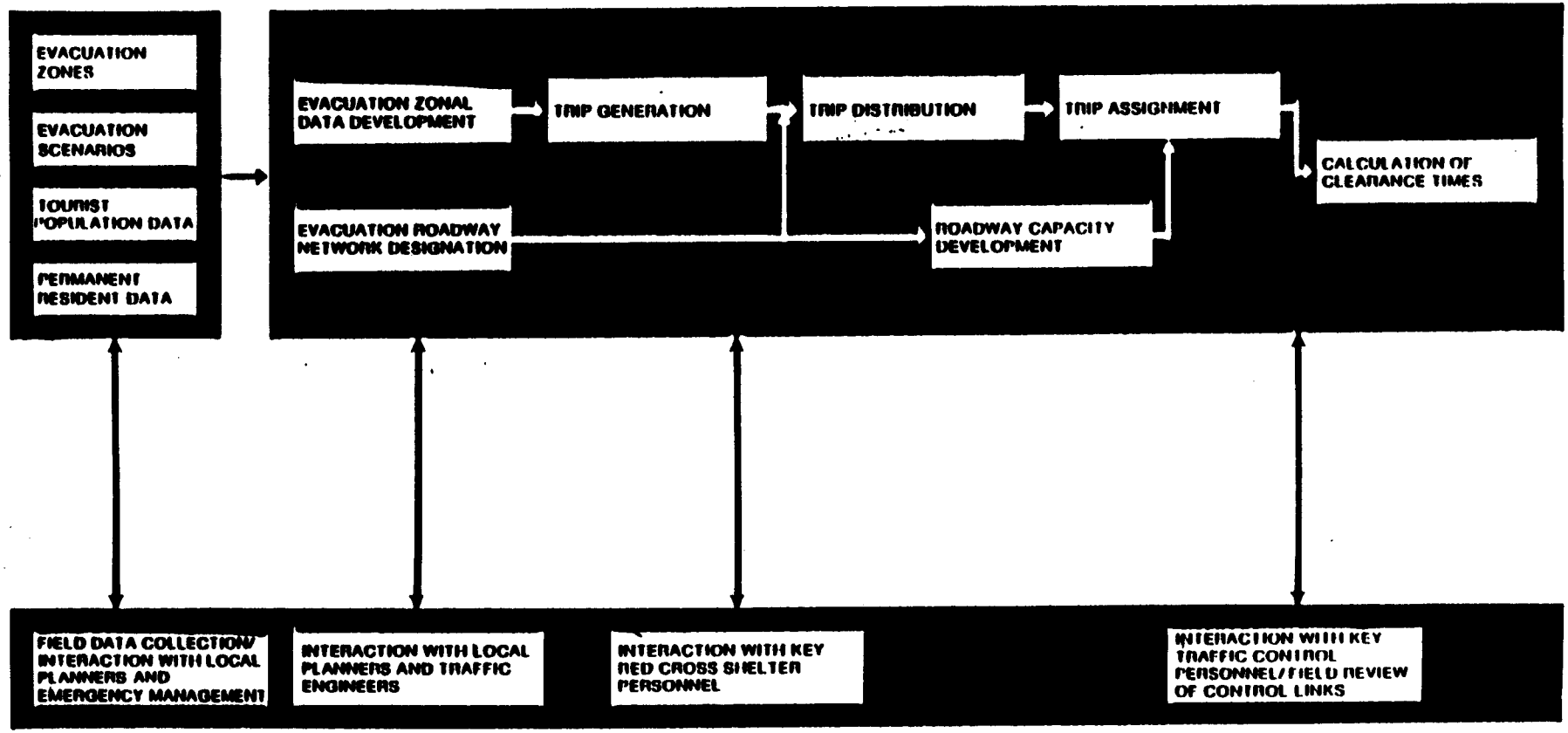

Figure 6-3

2. Evacuation Road Network Preparation - This step involved developing information for those roadways selected for inclusion in the evacuation road network. Information was coded into a "link file" for use by the assignment computer module. The end product of the step was a computerized representation of the roadway system.

3. Trip Generation - Specific dwelling unit variables were used in the trip generation calculations to produce total evacuating people and vehicles originating from each evacuation zone. Originating vehicles and people were stratified by destination type based on behavioral and population parameters previously established. Hotel/motel information coupled with public shelter capacity information were used to develop estimates of the number of evacuating vehicles that would find acceptable destinations in each zone.

4. Trip Distribution - This step concentrated only on those trips originating in a county and finding acceptable destinations within the same county. Productions from each zone were matched with available attractions in all zones. The end product of the step was a trip table showing trips between each zone and all other zones for each evacuation destination type. A unique trip table was developed for each storm scenario, and for each tested behavioral assumption.

5. Roadway Capacity Development - Number of lanes and facility type information for each roadway link in the evacuation network were translated into a general hourly service volume for comparative purposes. Specific hourly flow rates were then developed for the most critical roadway segments and intersections after thorough field review.

6. Trip Assignment - This step included the use of another microcomputer program to assign zone to zone trips onto the road segments included in the computerized roadway system. All other categories of evacuation travel patterns (in-county to out-of-county, out-of-county to in-county, out-of-county to out-of-county, and background) were then added in to arrive at total evacuation vehicles per roadway segment. This step then developed a series of volume to capacity ratios to determine which roadway segments would be most congested by evacuation vehicles. Those links with the highest volume to capacity ratio were identified for each county.

7. Calculation of Clearance Times - Travel Time/Queuing Delay Analysis - This step involved a detailed look at the critical links and intersections identified for the eighteen jurisdictions of the study area. Initially, evacuation zones using the critical link of interest were identified. Evacuation vehicles from each zone were then released to the network in accordance with a behavioral response curve. Based on assumed hourly flow rate for the critical link, the hourly volume desiring to use the link was then translated into a queuing delay time at the link and an evacuation travel time. The end product of this major step was a set of clearance times for each storm scenario.

MODEL APPLICATION

Application of the transportation modeling methodology produced several key data items for hurricane evacuation planning and preparedness. Completion of the transportation modeling produced the following:

1. Evacuating people and vehicle parameters
2. Shelter demand and capacity considerations
3. Traffic volumes and critical roadway segments
4. Estimated clearance times

Although many pieces of information are produced in the transportation analysis, these data items are most critical to planning shelter needs, and defining the timing requirements of an evacuation.

Evacuating People and Vehicle Parameters

Using a microcomputer process, total evacuating vehicles and people produced by each zone were split by destination type (public shelter, hotel/motel unit, friend or relative's home, or out of the county). This was accomplished for each storm scenario and further refined by assumed behavioral characteristics of the population-at-risk. The Transportation Model Support Document provides this data for the evacuation zones of Dade county.

Table 6-2 provides the number of evacuating people for Dade County. The number of people evacuating and vehicles expected to be utilized in hurricane evacuations are given in a range due to the effect of testing different storm scenarios and tourist unit occupancies. Thus, the highest number relates to a high seasonal occupancy and the most severe hurricane storm category. Figures are based on 1991 population estimates and previously discussed behavioral aspects of vulnerability areas relating to the Maximum Envelope of Water limits for all hurricane directions and speeds. It is important to remember evacuating people figures include mobile home residents and a small percentage of persons who will evacuate although theoretically not vulnerable.

TABLE 6-2
DADE COUNTY
EVACUATING PEOPLE STATISTICS
Lower Southeast Florida Hurricane Evacuation Study

Storm Scenario	People Evacuating Dwelling Units	People Going to Public Shelter
Category 1 Hurricane normal seasonal occupancy	227,210 (173,730 from surge zones) (44,870 from mobile homes) (8,610 from "non vulnerable" units)	29,120
Category 1 Hurricane late November seasonal occupancy	257,080 (203,520 from surge zones) (44,870 from mobile homes) (8,690 from "non vulnerable" units)	32,105
Category 2-3 Hurricane normal seasonal occupancy	408,740 (348,690 from surge zones) (44,870 from mobile homes) (15,180 from "non vulnerable" units)	47,020
Category 2-3 Hurricane late November seasonal occupancy	444,275 (384,115 from surge zones) (44,870 from mobile homes) (15,290 from "non vulnerable" units)	50,575
Category 4-5 Hurricane normal seasonal occupancy	589,155 (516,555 from surge zones) (44,870 from mobile homes) (27,730 from "non vulnerable" units)	75,185
Category 4-5 Hurricane late November seasonal occupancy	628,690 (555,980 from surge zones) (44,870 from mobile homes) (27,840 from "non vulnerable" units)	79,140

Key Assumptions

1991 assumed base year population - 1,900,000

1991 Dwelling Units interpolated from the 1986 and 2010 traffic analysis zonal data bases available through the Metropolitan Dade County Planning Department.

Occupancy of tourist/seasonal units - two levels (45% and 85%)

Figures include 100% of permanent and seasonal residents in surge zones and a small portion (½% - 1½%) of the theoretically non-vulnerable population was also included in each scenario.

Assumed percent of evacuees to public shelter was varied by evacuation zone and storm scenario depending on a zone's distance from the coastline and general income level - for example, high income barrier island zone's figures were 5 to 10 percent while "mobile home only" zones were 30 to 35 percent in this regard.

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Shelter Demand/Capacity Considerations

After matching evacuee's destination desires with available shelters, the transportation analysis revealed that hotel/motel space will not be as widely available within the county as perceived by the evacuating population. For transportation modeling purposes, those evacuees unable to be accommodated by study area hotel/motel space were assumed to find hotel/motel space outside the study area.

Table 6-2 in addition to total evacuating people statistics, provides the calculated public shelter demand by storm scenario. Shelter space is generally adequate in Dade County for in-county demand during a less severe hurricane. However, for upper category hurricanes (category 4-5), there is a shortage of space in the south part of the county. Public shelters are currently being reevaluated in Dade County and spcific locations and capacities of shelters are subject to change. The available capacity of _____ people would have to handle a range of 29,100 to 79,100 expected public shelter evacuees depending on storm scenario.

Traffic Volumes and Critical Roadway Segments

The Transportation Model Support Document provides the assigned evacuating vehicle figures by scenario for all roadway segments in the county's evacuation network. In addition, the model document provides the volume to capacity ratios calculated for each link. Those roadway segments with the highest volume to capacity ratios were identified as the critical links for each scenario. Table 6-3 lists the critical roadway segments. Critical links and intersections are listed in order of severity. These links control the flow of evacuation traffic during a hurricane evacuation and are key areas for traffic control and monitoring.

Estimated Clearance Times

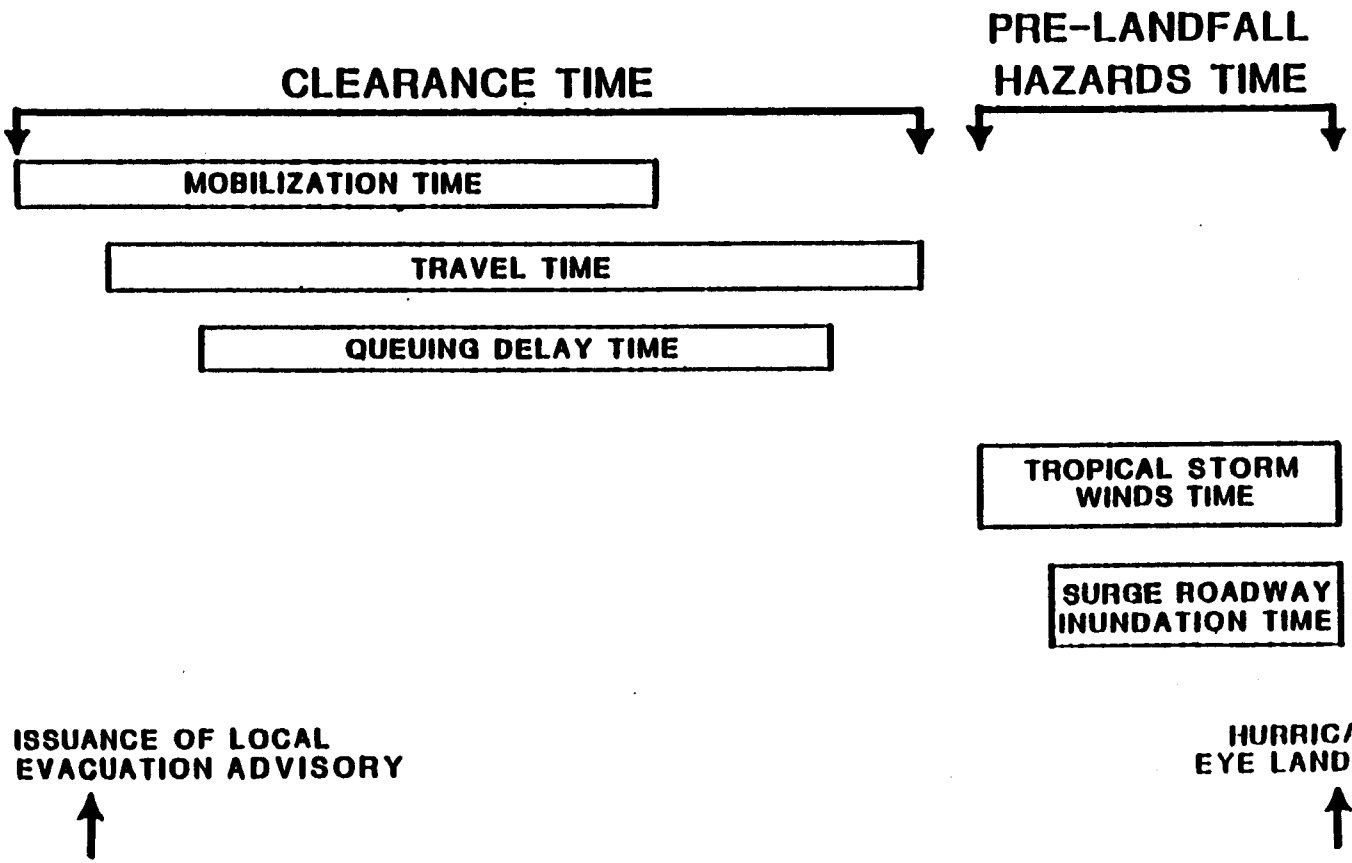
The most important product of the transportation analysis is the clearance times developed by storm scenario. Clearance time is one of two major considerations involved in issuing an evacuation or storm advisory. Clearance time must be weighed with respect to the arrival of tropical storm winds to make a prudent evacuation decision. Figure 6-4 illustrates these two timing issues of evacuation and their relation.

TABLE 6-3

CRITICAL ROADWAY SEGMENTS
Dade County
Lower Southeast Florida Hurricane Evacuation Study

MacArthur Causeway and Alton Road intersection
U.S. 1 south of Florida City
Collins Avenue between Arthur Godfrey Road and 5th Street
Arthur Godfrey Road and Alton Road intersection
Broad Causeway/N.E. 123rd Street and U.S. 1 intersection
Florida Turnpike - Homestead Extension south of U.S. 1
Florida Turnpike - Homestead Extension south of South Dade Expressway
Florida Turnpike - Homestead Extension from U.S. 41 to Florida Turnpike
U.S. 1 at Homestead
(All drawbridges)
(All northbound on ramps to Florida Turnpike and I-95)

COMPONENTS OF EVACUATION TIME



Clearance time is the time required to clear the roadways of all vehicles evacuating in response to a hurricane situation. Clearance time begins when the first evacuating vehicle enters the road network (as defined by a hurricane evacuation behavioral response curve) and ends when the last evacuating vehicle reaches an assumed point of safety. Clearance time includes the time required by evacuees to secure their homes and prepare to leave (referred to as mobilization time), the time spent by evacuees traveling along the road network (referred to as travel time), and the time spent by evacuees waiting along the road network due to traffic congestion (referred to as queuing delay time). Clearance time does not relate to the time any one vehicle spends traveling on the road network.

Table 6-4 presents the clearance times estimated for Dade County. Clearance times are stratified by intensity of hurricane (storm scenario), by rate of response on the part of the evacuating population, and by level of seasonal occupancy. Clearance times are presented for local (only) movements as well as for traffic on the Florida Turnpike in Palm Beach County. The times for regional facilities are significant in length and could be much higher as Treasure Coast evacuees from Martin, St. Lucie, and Indian River counties are not factored in. It is important to note that clearance times are based on the assumptions that local officials will attempt to evacuate residents out of dwelling units located in the areas shown as flooded by storm surge (by the SLOSH model). The hazards analysis chapter of the Technical Data Report defines these surge limits and the theory behind their derivation.

TRAFFIC CONTROL ISSUES

The movement of evacuating vehicles during hurricane evacuation requires extensive traffic control efforts to make maximum use of roadway capacity and to expedite safe escape from hurricane hazards. The development of traffic control techniques for critical evacuation roadway links and intersections should always be developed by local police, state highway patrol, state departments of transportation, local traffic engineers, emergency management personnel and the U.S. Coast Guard working together cooperatively. The following traffic control issues are recommended for consideration:

1. The large number of vehicles expected to accumulate on the Florida Turnpike and I-95 during a major hurricane threat necessitates that the State of Florida address multi-regional evacuation movements, reverse lane strategies, and inland shelter supplies/staffing issues (particularly in Orlando).

2. All available tow trucks should be positioned or on call along key travel corridors and critical links. At a minimum, tow trucks should be at major bridge crossings to remove disabled vehicles.

3. Where intersections will continue to have signalized control, signal patterns providing the most "green time" for the westbound approach leading away from the coast should be actuated by the local traffic engineer's office as appropriate.

4. All draw/swing bridges needed for evacuation should be locked in the "down" position during a hurricane warning if possible. Boat owners must be made aware of flotilla plans and time requirements for securing vessels. Optimally, recreational vehicles should be moved to safe harbor during or before a hurricane watch. This judgement will need to be made on a case by case basis through discussions between the U.S. Coast Guard, and local emergency officials.

5. Once a hurricane warning is posted for counties in Southeast Florida, toll collections on the Florida Turnpike should be suspended. If bonding requirements do not allow for this, this action could be achieved by the Governor ordering toll attendants to leave their toll booths and go home to prepare for the storm.

TABLE 6-4

CLEARANCE TIMES
Dade County
Lower Southeast Florida Hurricane Evacuation Study

Category 1 Hurricane	Summer Seasonal Occupancy	Late Fall/November Seasonal Occupancy
Rapid Response	11½	14¼
Medium Response	12	15
Slow Response	13	15¾
Category 2-3 Hurricane		
Rapid Response	11½ (8¾)	14¼ (12)
Medium Response	12 (9½)	15 (12¼)
Slow Response	13 (10½)	15¾ (13¼)
Category 4-5 Hurricane		
Rapid Response	11½ (13½)	14¼ (16)
Medium Response	12 (14)	15 (16½)
Slow Response	13 (15)	15¾ (17¼)

Notes: Number in parentheses is for south part of Dade County. Category 1 hurricane scenario assumes full evacuation of beaches (all areas east of Intracoastal Waterway). Times needed to clear U.S. 1 south of Florida City can be much higher than these shown above for certain scenarios - however those times imply that Monroe County must start evacuating earlier than Dade County. Also, clearance times for Dade County residents going out of county will be much higher (please see Palm Beach clearance time tables concerning the Florida Turnpike and I-95).

TABLE 6-4

CLEARANCE TIMES*
Palm Beach County
Lower Southeast Florida Hurricane Evacuation Study

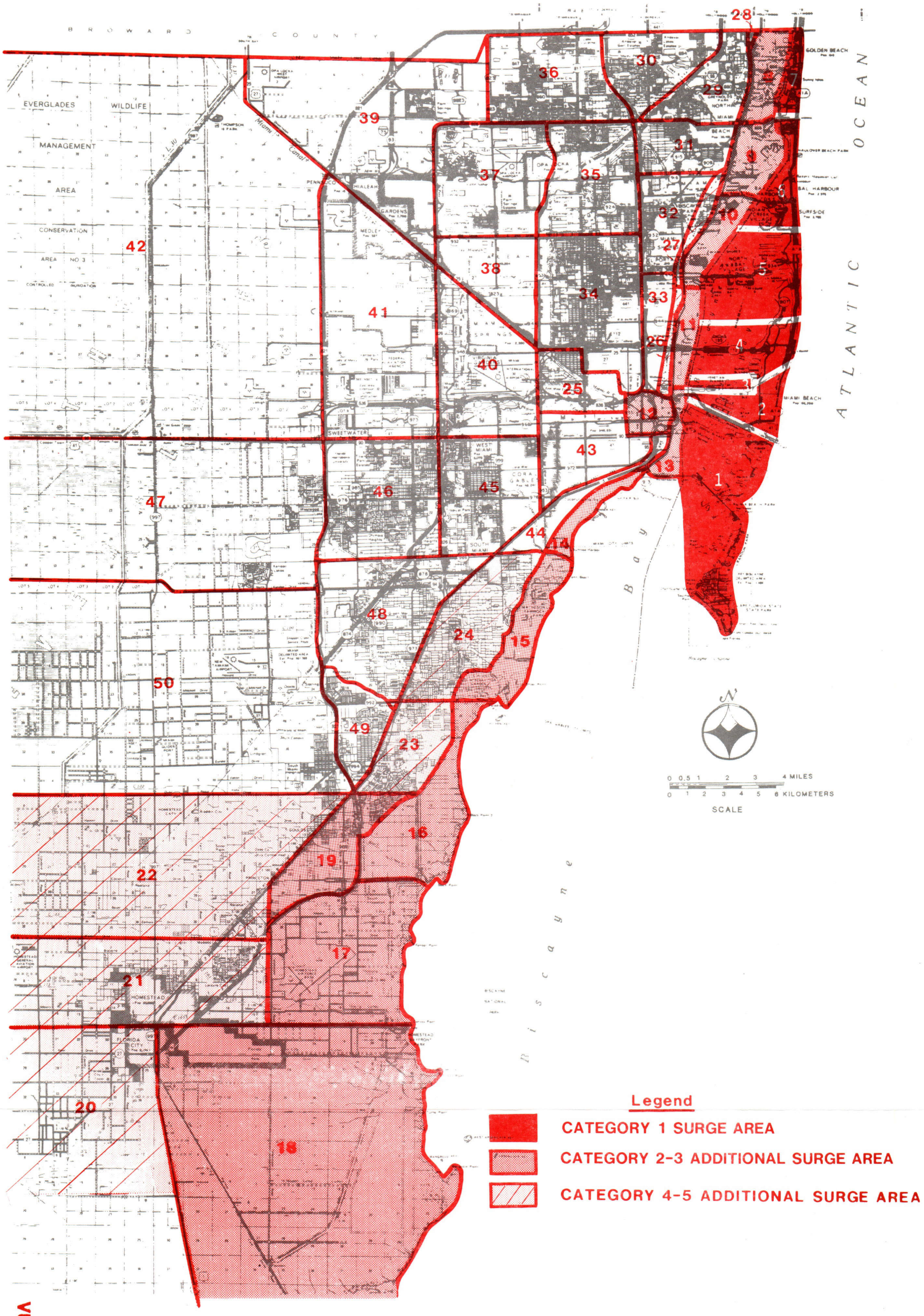
(Florida Turnpike/I-95 Evacuation Movements)

Category 1-2 Hurricane	Summer Seasonal Occupancy	Late Fall/November Seasonal Occupancy
Rapid Response	15¼	19¼
Medium Response	15½	19¾
Slow Response	16¼	20¼
Category 3 Hurricane		
Rapid Response	24¼	29
Medium Response	24¾	29¼
Slow Response	25¼	30
Category 4-5 Hurricane		
Rapid Response	36½	41¼
Medium Response	37	41¾
Slow Response	37½	42¼

* Clearance times reflect accumulation of Monroe, Dade, Broward and Palm Beach County out of county movements on the Florida Turnpike and I-95. Times could be worse than these "upstream" as Treasure Coast evacuees attempt to evacuate out of county.

DADE COUNTY

VULNERABLE AREAS AND EVACUATION ZONES

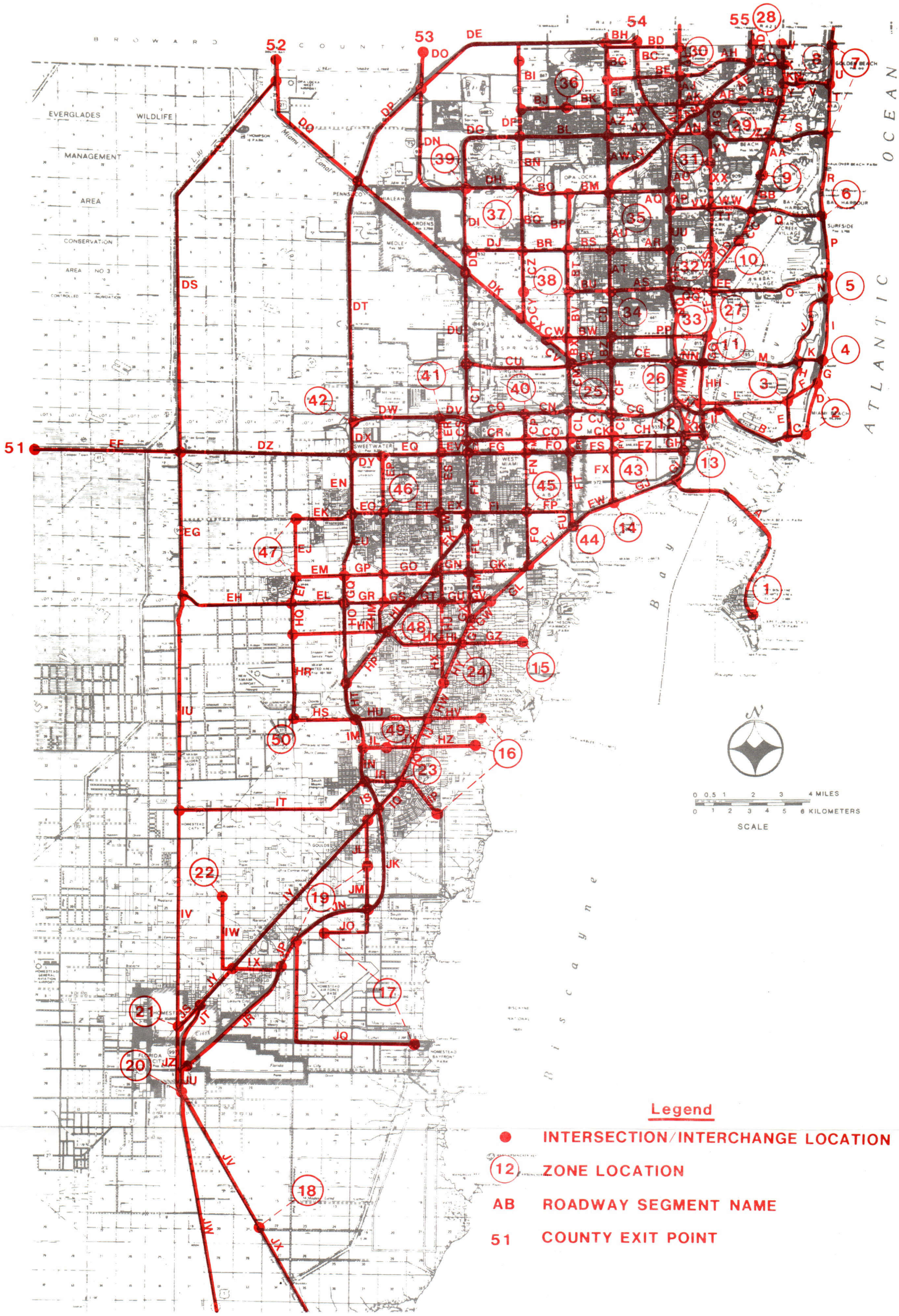


Legend

- CATEGORY 1 SURGE AREA
- CATEGORY 2-3 ADDITIONAL SURGE AREA
- CATEGORY 4-5 ADDITIONAL SURGE AREA

EVACUATION ROADWAY NETWORK

DADE COUNTY



Legend

- ● INTERSECTION/INTERCHANGE LOCATION
- (12) ZONE LOCATION
- AB ROADWAY SEGMENT NAME
- 51 COUNTY EXIT POINT

CATEGORY 1 NORMAL OCCUPANCY

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA01	9017					3371				
			650	4073	900	3389		244	1510	336	1278
ZONE NO	DA02	60266					22939				
			4592	24180	6025	25463		1762	9011	2293	9869
ZONE NO	DA03	3275					1216				
			231	1538	326	1176		85	568	120	437
ZONE NO	DA04	26733					10285				
			2101	9911	2672	12045		816	3706	1027	4731
ZONE NO	DA05	39417					14847				
			2911	16977	3940	15583		1103	6309	1484	5948
ZONE NO	DA06	19567					7402				
			1463	8195	1956	7950		557	3048	739	3053
ZONE NO	DA07	15621					6001				
			1222	5856	1561	6977		473	2188	599	2736
ZONE NO	DA08	145					64				
			43	79	0	21		19	35	0	9
ZONE NO	DA09	1695					758				
			508	931	0	254		227	416	0	113
ZONE NO	DA10	105					47				
			31	57	0	15		14	25	0	7
ZONE NO	DA11	59					32				
			15	28	0	12		8	15	0	5
ZONE NO	DA12	254					113				
			73	133	1	45		32	59	0	19
ZONE NO	DA13	41					22				
			10	19	0	8		6	11	0	4
ZONE NO	DA14	48					21				
			13	25	0	7		6	11	0	3

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA15	18					8				
			5	9	0	2		2	4	0	1
ZONE NO	DA16	12					5				
			3	6	0	1		1	2	0	0
ZONE NO	DA17	2962					1325				
			888	1629	0	444		397	728	0	198
ZONE NO	DA18	3180					1423				
			954	1749	0	477		426	782	0	213
ZONE NO	DA19	297					132				
			88	162	0	44		39	72	0	19
ZONE NO	DA20	3102					1387				
			930	1706	0	465		416	762	0	208
ZONE NO	DA21	3067					1372				
			919	1685	0	461		411	754	0	205
ZONE NO	DA22	902					404				
			270	496	0	135		121	222	0	60
ZONE NO	DA23	118					53				
			35	64	0	17		15	29	0	7
ZONE NO	DA24	423					189				
			126	232	0	63		56	103	0	28
ZONE NO	DA25	2441					1091				
			729	1337	0	370		326	596	0	165
ZONE NO	DA26	36					16				
			9	17	0	6		4	7	0	3
ZONE NO	DA27	2101					940				
			628	1152	0	317		281	515	0	141
ZONE NO	DA28	2					1				
			0	1	0	0		0	0	0	0

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA29	975	292	535	0	146	436	130	239	0	65
ZONE NO	DA30	221	66	121	0	33	98	29	53	0	14
ZONE NO	DA31	961	288	528	0	144	429	128	235	0	64
ZONE NO	DA32	1729	518	950	0	259	773	231	425	0	115
ZONE NO	DA33	734	219	402	0	110	328	98	179	0	49
ZONE NO	DA34	3144	942	1728	0	472	1407	421	773	0	210
ZONE NO	DA35	2559	767	1406	0	383	1145	343	629	0	171
ZONE NO	DA36	1997	598	1097	0	299	893	267	491	0	133
ZONE NO	DA37	1490	446	818	0	224	667	199	366	0	99
ZONE NO	DA38	784	234	430	0	116	350	104	191	0	52
ZONE NO	DA39	1163	348	639	0	174	519	155	285	0	77
ZONE NO	DA40	3970	1186	2174	1	604	1775	530	972	0	269
ZONE NO	DA41	3330	998	1830	0	500	1490	446	818	0	223
ZONE NO	DA42	3484	1045	1916	0	522	1559	467	857	0	233
ZONE NO	DA43	600	178	327	0	91	267	79	146	0	39
ZONE NO	DA44	183	54	99	0	28	81	24	44	0	12
ZONE NO	DA45	223	66	121	0	35	99	29	53	0	14
ZONE NO	DA46	404	121	222	0	60	181	54	99	0	27
ZONE NO	DA47	492	147	270	0	73	220	66	121	0	33
ZONE NO	DA48	411	123	225	0	61	184	55	101	0	27
ZONE NO	DA49	142	42	78	0	21	63	18	34	0	9
ZONE NO	DA50	3310	993	1820	0	496	1481	444	814	0	222
		227209	29118	99983	17382	80600	89912	12164	39415	6598	31617

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 1 NORMAL OCCUPANCY

DADE COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.90	1.90	1.90	1.90	1.90	1.90	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	0.68	1.00	1.70	1.70	1.70	1.70	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.00	1.00	1.05	1.05	1.05	1.05	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	45.00	45.00	45.00	45.00	45.00	45.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	7.00	30.00	30.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00
Friend	48.00	55.00	55.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	15.00	15.00	15.00	15.00	15.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7
GROUP # 2: 11,13
GROUP # 3: 8,9,10,12,14,15,16,17,18,19
GROUP # 4: 20,21,22,23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38
GROUP # 6: 39,40,41,42,43,44,45,46,47,48,49,50
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 1 NOVEMBER OCCUPANCY

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA01	9611					3621				
			710	4133	960	3805		269	1535	361	1453
ZONE NO	DA02	71368					27613				
			5703	25291	7136	33235		2230	9479	2761	13141
ZONE NO	DA03	3353					1248				
			239	1546	334	1230		88	571	123	460
ZONE NO	DA04	33564					13161				
			2784	10594	3355	16826		1104	3994	1315	6745
ZONE NO	DA05	43959					16760				
			3366	17432	4395	18762		1294	6500	1675	7287
ZONE NO	DA06	22365					8580				
			1743	8475	2236	9908		675	3166	857	3878
ZONE NO	DA07	19458					7616				
			1606	6240	1945	9663		635	2350	761	3867
ZONE NO	DA08	145					65				
			43	79	0	21		19	35	0	9
ZONE NO	DA09	1696					759				
			508	931	0	255		227	416	0	113
ZONE NO	DA10	106					48				
			31	57	0	16		14	25	0	7
ZONE NO	DA11	66					34				
			16	29	1	16		8	15	0	7
ZONE NO	DA12	266					118				
			74	134	2	54		33	60	1	23
ZONE NO	DA13	46					24				
			11	20	1	12		6	11	0	5
ZONE NO	DA14	49					21				
			13	25	0	8		6	11	0	3

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA15	18					8				
			5	9	0	2		2	4	0	1
ZONE NO	DA16	12					5				
			3	6	0	1		1	2	0	0
ZONE NO	DA17	2962					1325				
			888	1629	0	444		397	728	0	198
ZONE NO	DA18	3180					1423				
			954	1749	0	477		426	782	0	213
ZONE NO	DA19	297					132				
			88	162	0	44		39	72	0	19
ZONE NO	DA20	3103					1387				
			930	1706	0	465		416	762	0	208
ZONE NO	DA21	3070					1374				
			919	1685	0	463		411	754	0	206
ZONE NO	DA22	902					404				
			270	496	0	135		121	222	0	60
ZONE NO	DA23	119					53				
			35	64	0	17		15	29	0	7
ZONE NO	DA24	423					189				
			126	232	0	63		56	103	0	28
ZONE NO	DA25	2449					1094				
			730	1338	1	375		326	598	0	167
ZONE NO	DA26	39					17				
			9	17	0	9		4	7	0	4
ZONE NO	DA27	2105					941				
			628	1152	0	319		281	515	0	142
ZONE NO	DA28	2					1				
			0	1	0	0		0	0	0	0

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA29	976					437				
			292	535	0	147		130	239	0	65
ZONE NO	DA30	222					99				
			66	121	0	34		29	53	0	14
ZONE NO	DA31	962					430				
			288	528	0	145		128	235	0	64
ZONE NO	DA32	1729					774				
			518	950	0	259		231	425	0	115
ZONE NO	DA33	735					328				
			219	402	0	111		98	179	0	49
ZONE NO	DA34	3146					1408				
			942	1728	0	474		421	773	0	211
ZONE NO	DA35	2559					1145				
			767	1406	0	383		343	629	0	171
ZONE NO	DA36	1998					894				
			598	1097	0	300		267	491	0	133
ZONE NO	DA37	1492					667				
			446	818	0	225		199	366	0	99
ZONE NO	DA38	786					350				
			234	430	0	119		104	191	0	53
ZONE NO	DA39	1164					520				
			348	639	0	175		155	285	0	77
ZONE NO	DA40	3986					1781				
			1188	2176	3	615		531	973	1	274
ZONE NO	DA41	3333					1491				
			998	1830	0	502		446	818	0	224
ZONE NO	DA42	3484					1559				
			1045	1916	0	522		467	857	0	233
ZONE NO	DA43	603					269				
			178	327	0	93		79	146	0	40
ZONE NO	DA44	185					82				
			54	99	0	30		24	44	0	13
ZONE NO	DA45	226					100				
			66	121	0	37		29	53	0	15
ZONE NO	DA46	404					181				
			121	222	0	60		54	99	0	27
ZONE NO	DA47	492					220				
			147	270	0	73		66	121	0	33
ZONE NO	DA48	411					184				
			123	225	0	61		55	101	0	27
ZONE NO	DA49	142					63				
			42	78	0	21		18	34	0	9
ZONE NO	DA50	3310					1481				
			993	1820	0	496		444	814	0	222
		257079	32105	%102970	20369	%101507	102486	13421	40672	7855	40413

1 = Public Shelter
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4 = Out of County

CATEGORY 1 NOVEMBER OCCUPANCY

DADE COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.90	1.90	1.90	1.90	1.90	1.90	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	0.68	1.00	1.70	1.70	1.70	1.70	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.00	1.00	1.05	1.05	1.05	1.05	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	85.00	85.00	85.00	85.00	85.00	85.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	7.00	30.00	30.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00
Friend	48.00	55.00	55.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	15.00	15.00	15.00	15.00	15.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7
GROUP # 2: 11,13
GROUP # 3: 8,9,10,12,14,15,16,17,18,19
GROUP # 4: 20,21,22,23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38
GROUP # 6: 39,40,41,42,43,44,45,46,47,48,49,50
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 2-3 NORMAL OCCUPANCY

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA01	9017					3371				
			650	4073	900	3389		244	1510	336	1278
ZONE NO	DA02	60266					22939				
			4592	24180	6025	25463		1762	9011	2293	9869
ZONE NO	DA03	3275					1216				
			231	1538	326	1176		85	568	120	437
ZONE NO	DA04	26733					10285				
			2101	9911	2672	12045		816	3706	1027	4731
ZONE NO	DA05	39417					14847				
			2911	16977	3940	15583		1103	6309	1484	5948
ZONE NO	DA06	19567					7402				
			1463	8195	1956	7950		557	3048	739	3053
ZONE NO	DA07	15621					6001				
			1222	5856	1561	6977		473	2188	599	2736
ZONE NO	DA08	29028					12978				
			2902	18787	1458	5878		1297	8403	651	2623
ZONE NO	DA09	10556					4711				
			1055	6766	536	2196		470	3025	238	975
ZONE NO	DA10	21328					9532				
			2131	13774	1073	4344		553	6161	479	1937
ZONE NO	DA11	12284					6360				
			1227	7158	688	3205		635	3829	345	1547
ZONE NO	DA12	51114					22698				
			5111	31697	2694	11609		2269	14163	1188	5076
ZONE NO	DA13	8638					4470				
			863	5023	485	2263		446	2687	242	1090
ZONE NO	DA14	9657					4298				
			965	6077	500	2112		429	2716	221	929

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA15	3911					1746				
			390	2514	197	806		173	1123	87	358
ZONE NO	DA16	2636					1179				
			263	1713	131	527		117	766	58	235
ZONE NO	DA17	10490					4693				
			1049	6818	524	2098		469	3050	234	938
ZONE NO	DA18	4322					1933				
			432	2809	216	864		193	1256	96	386
ZONE NO	DA19	18769					8391				
			1876	12142	943	3804		838	5431	420	1697
ZONE NO	DA20	3127					1393				
			937	1719	0	468		419	769	0	209
ZONE NO	DA21	3299					1475				
			987	1810	0	497		441	809	0	221
ZONE NO	DA22	980					439				
			294	539	0	147		131	241	0	65
ZONE NO	DA23	237					106				
			70	129	0	35		31	58	0	15
ZONE NO	DA24	581					260				
			174	319	0	87		77	142	0	38
ZONE NO	DA25	2596					1161				
			774	1418	1	398		346	634	0	177
ZONE NO	DA26	74					32				
			19	36	0	14		8	15	0	6
ZONE NO	DA27	2171					970				
			648	1189	0	330		290	531	0	147
ZONE NO	DA28	4					2				
			1	2	0	0		0	1	0	0

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4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA29	1226					549				
			367	673	0	184		164	301	0	82
ZONE NO	DA30	444					198				
			133	243	0	67		59	108	0	29
ZONE NO	DA31	1196					535				
			358	656	0	180		160	293	0	80
ZONE NO	DA32	1953					875				
			585	1073	0	293		262	480	0	131
ZONE NO	DA33	963					431				
			288	528	0	146		129	236	0	64
ZONE NO	DA34	3725					1666				
			1116	2046	0	561		499	915	0	250
ZONE NO	DA35	2835					1267				
			850	1558	0	425		380	696	0	190
ZONE NO	DA36	2280					1020				
			683	1252	0	342		305	560	0	152
ZONE NO	DA37	1828					818				
			547	1003	0	275		244	448	0	123
ZONE NO	DA38	1182					529				
			353	647	0	178		158	289	0	80
ZONE NO	DA39	1380					618				
			413	757	0	207		185	339	0	92
ZONE NO	DA40	4290					1917				
			1279	2342	3	663		571	1047	1	294
ZONE NO	DA41	3651					1633				
			1093	2005	0	549		489	897	0	245
ZONE NO	DA42	3504					1567				
			1051	1927	0	525		470	861	0	235
ZONE NO	DA43	1199					536				
			357	655	0	183		159	293	0	80
ZONE NO	DA44	365					163				
			108	198	0	57		48	88	0	25
ZONE NO	DA45	446					199				
			132	242	0	70		59	108	0	30
ZONE NO	DA46	810					362				
			243	445	0	121		108	199	0	54
ZONE NO	DA47	986					441				
			295	542	0	147		132	242	0	66
ZONE NO	DA48	823					368				
			246	452	0	123		110	202	0	55
ZONE NO	DA49	284					127				
			85	156	0	42		38	69	0	19
ZONE NO	DA50	3668					1641				
			1100	2017	0	550		492	902	0	246
		408737	47019	%214586	26829	%120153	172350	20293	91723	10858	49343

1 = Public Shelter
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CATEGORY 2-3 NORMAL OCCUPANCY

DADE COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.90	1.90	1.90	1.90	1.90	1.90	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	0.68	1.00	1.70	1.70	1.70	1.70	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.00	1.00	1.05	1.05	1.05	1.05	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	45.00	45.00	45.00	45.00	45.00	45.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	7.00	10.00	10.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00
Friend	48.00	65.00	65.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	20.00	20.00	15.00	15.00	15.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7
GROUP # 2: 11,13
GROUP # 3: 8,9,10,12,14,15,16,17,18,19
GROUP # 4: 20,21,22,23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38
GROUP # 6: 39,40,41,42,43,44,45,46,47,48,49,50
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 2-3 NOVEMBER OCCUPANCY

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA01	9611					3621				
			710	4133	960	3805		269	1535	361	1453
ZONE NO	DA02	71368					27613				
			5703	25291	7136	33235		2230	9479	2761	13141
ZONE NO	DA03	3353					1248				
			239	1546	334	1230		88	571	123	460
ZONE NO	DA04	33564					13161				
			2784	10594	3355	16826		1104	3994	1315	6745
ZONE NO	DA05	43959					16760				
			3366	17432	4395	18762		1294	6500	1675	7287
ZONE NO	DA06	22365					8580				
			1743	8475	2236	9908		675	3166	857	3878
ZONE NO	DA07	19458					7616				
			1606	6240	1945	9663		635	2350	761	3867
ZONE NO	DA08	29158					13028				
			2915	18800	1471	5969		1302	8408	656	2658
ZONE NO	DA09	10709					4771				
			1070	6781	551	2303		476	3031	244	1016
ZONE NO	DA10	21470					9587				
			2146	13789	1088	4444		958	6166	484	1975
ZONE NO	DA11	13617					6851				
			1361	7292	822	4138		684	3878	394	1891
ZONE NO	DA12	53579					23652				
			5357	31943	2940	13335		2364	14258	1283	5743
ZONE NO	DA13	9592					4821				
			958	5118	580	2931		481	2722	277	1337
ZONE NO	DA14	9980					4423				
			997	6109	532	2338		441	2728	233	1016

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DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA15	3954					1763				
			395	2519	202	836		175	1125	89	369
ZONE NO	DA16	2636					1179				
			263	1713	131	527		117	766	58	235
ZONE NO	DA17	10490					4693				
			1049	6618	524	2098		469	3050	234	938
ZONE NO	DA18	4322					1933				
			432	2809	216	864		193	1256	96	386
ZONE NO	DA19	18860					8426				
			1885	12151	952	3868		842	5435	424	1722
ZONE NO	DA20	3127					1400				
			937	1719	0	469		419	769	0	209
ZONE NO	DA21	3305					1477				
			988	1811	1	502		441	809	0	223
ZONE NO	DA22	980					439				
			294	539	0	147		131	241	0	65
ZONE NO	DA23	238					107				
			70	129	0	36		31	58	0	15
ZONE NO	DA24	583					260				
			174	319	0	88		77	142	0	38
ZONE NO	DA25	2611					1167				
			776	1420	3	409		347	635	1	182
ZONE NO	DA26	81					35				
			20	37	1	19		8	15	0	8
ZONE NO	DA27	2179					974				
			649	1190	1	335		290	531	0	149
ZONE NO	DA28	5					2				
			1	2	0	0		0	1	0	0

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DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA29	1228					550				
			367	673	0	185		164	301	0	83
ZONE NO	DA30	446					198				
			132	243	0	68		59	108	0	29
ZONE NO	DA31	1199					536				
			358	656	0	182		160	293	0	81
ZONE NO	DA32	1955					875				
			585	1073	0	293		262	480	0	131
ZONE NO	DA33	967					433				
			288	528	0	148		129	236	0	65
ZONE NO	DA34	3729					1667				
			1116	2046	0	564		499	915	0	251
ZONE NO	DA35	2836					1268				
			850	1558	0	426		380	696	0	190
ZONE NO	DA36	2283					1021				
			683	1252	0	344		305	560	0	153
ZONE NO	DA37	1831					819				
			547	1003	0	278		244	448	0	123
ZONE NO	DA38	1186					530				
			353	647	0	181		158	289	0	81
ZONE NO	DA39	1382					618				
			413	757	0	208		185	339	0	93
ZONE NO	DA40	4322					1929				
			1282	2345	6	685		572	1048	2	303
ZONE NO	DA41	3655					1635				
			1093	2005	0	552		489	897	0	246
ZONE NO	DA42	3505					1567				
			1051	1927	0	525		470	861	0	235
ZONE NO	DA43	1206					538				
			358	656	1	187		159	293	0	82
ZONE NO	DA44	370					165				
			109	199	1	61		48	88	0	26
ZONE NO	DA45	452					202				
			133	243	1	74		59	108	0	32
ZONE NO	DA46	810					362				
			243	445	0	121		108	199	0	54
ZONE NO	DA47	986					441				
			295	542	0	147		132	242	0	66
ZONE NO	DA48	824					369				
			246	452	0	124		110	202	0	55
ZONE NO	DA49	284					127				
			85	156	0	42		38	69	0	19
ZONE NO	DA50	3668					1641				
			1100	2017	0	550		492	902	0	246
		444274	50575	%218142	30385	%145030	187074	21763	93193	12328	59650

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CATEGORY 2-3 NOVEMBER OCCUPANCY

DADE COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.90	1.90	1.90	1.90	1.90	1.90	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	0.68	1.00	1.70	1.70	1.70	1.70	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.00	1.00	1.05	1.05	1.05	1.05	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	85.00	85.00	85.00	85.00	85.00	85.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	7.00	10.00	10.00	30.00	30.00	30.00	0.00	0.00	0.00	0.00
Friend	48.00	65.00	65.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	20.00	20.00	15.00	15.00	15.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7
GROUP # 2: 11,13
GROUP # 3: 8,9,10,12,14,15,16,17,18,19
GROUP # 4: 20,21,22,23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38
GROUP # 6: 39,40,41,42,43,44,45,46,47,48,49,50
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 4-5 NORMAL OCCUPANCY

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA01	9017					3371				
			650	2820	900	4642		244	1047	336	1741
ZONE NO	DA02	60266					22939				
			4592	17014	6025	32630		1762	6359	2293	12521
ZONE NO	DA03	3275					1216				
			231	1060	326	1655		85	392	120	614
ZONE NO	DA04	26733					10285				
			2101	7053	2672	14903		816	2649	1027	5788
ZONE NO	DA05	39417					14847				
			2911	11831	3940	20730		1103	4404	1484	7853
ZONE NO	DA06	19567					7402				
			1463	5732	1956	10413		557	2137	739	3965
ZONE NO	DA07	15621					6001				
			1222	4161	1561	8673		473	1561	599	3363
ZONE NO	DA08	29028					12978				
			2902	14455	1458	10210		1297	6465	651	4561
ZONE NO	DA09	10556					4711				
			1055	5209	536	3754		470	2328	238	1671
ZONE NO	DA10	21328					9532				
			2131	10599	1073	7519		953	4741	479	3357
ZONE NO	DA11	12284					6360				
			1227	5541	688	4823		635	2958	345	2418
ZONE NO	DA12	51114					22698				
			5111	24447	2694	18860		2269	10919	1188	8319
ZONE NO	DA13	8638					4470				
			863	3889	485	3398		446	2076	242	1701
ZONE NO	DA14	9657					4298				
			965	4683	500	3506		429	2092	221	1552

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA15	3911					1746				
			390	1935	197	1385		173	864	87	617
ZONE NO	DA16	2636					1179				
			263	1318	131	922		117	589	58	412
ZONE NO	DA17	10490					4693				
			1049	5245	524	3671		469	2346	234	1642
ZONE NO	DA18	4322					1933				
			432	2161	216	1512		193	966	96	676
ZONE NO	DA19	18769					8391				
			1876	9343	943	6604		838	4178	420	2949
ZONE NO	DA20	8149					3640				
			1217	5252	7	1669		544	2349	3	743
ZONE NO	DA21	48925					21846				
			7303	31422	68	10128		3263	14052	26	4502
ZONE NO	DA22	16560					7408				
			2483	10758	1	3317		1110	4812	0	1482
ZONE NO	DA23	23790					10638				
			3563	15415	8	4799		1593	6896	3	2144
ZONE NO	DA24	31915					14269				
			4779	20668	13	6450		2137	9245	5	2880
ZONE NO	DA25	33516					14888				
			4939	20817	176	7583		2199	9302	68	3317
ZONE NO	DA26	7432					3278				
			1075	4400	78	1877		476	1963	30	806
ZONE NO	DA27	15958					7085				
			2348	9875	90	3642		1044	4411	34	1591
ZONE NO	DA28	504					222				
			72	299	4	124		31	132	1	53

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA29	1477					661				
			515	663	0	296		231	297	0	133
ZONE NO	DA30	665					297				
			231	297	0	134		103	133	0	59
ZONE NO	DA31	1432					640				
			499	642	0	287		223	287	0	127
ZONE NO	DA32	2180					976				
			762	980	0	436		341	438	0	195
ZONE NO	DA33	1195					534				
			416	535	0	241		186	239	0	107
ZONE NO	DA34	4305					1925				
			1504	1934	0	863		672	864	0	385
ZONE NO	DA35	3110					1391				
			1087	1398	0	622		486	625	0	278
ZONE NO	DA36	2566					1147				
			896	1152	0	514		401	515	0	229
ZONE NO	DA37	2166					968				
			756	972	0	436		338	434	0	194
ZONE NO	DA38	1580					706				
			550	708	0	318		246	316	0	141
ZONE NO	DA39	1599					715				
			558	718	0	321		249	321	0	142
ZONE NO	DA40	4610					2059				
			1599	2055	5	948		715	919	2	421
ZONE NO	DA41	3969					1776				
			1386	1782	0	797		620	797	0	355
ZONE NO	DA42	3525					1576				
			1233	1585	0	704		551	709	0	315
ZONE NO	DA43	1799					804				
			626	805	1	364		280	360	0	162
ZONE NO	DA44	548					244				
			189	243	0	113		84	108	0	50
ZONE NO	DA45	670					299				
			231	297	0	138		103	132	0	61
ZONE NO	DA46	1216					544				
			425	547	0	243		190	244	0	108
ZONE NO	DA47	1480					662				
			518	666	0	296		231	297	0	132
ZONE NO	DA48	1236					553				
			431	555	0	247		193	248	0	110
ZONE NO	DA49	426					190				
			149	191	0	85		66	85	0	38
ZONE NO	DA50	4028					1802				
			1409	1812	0	805		630	810	0	360
		589156	75183	%277939	27276	%208607	252790	32865	%121411	11029	87339

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 4-5 NORMAL OCCUPANCY

DADE COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.90	1.90	1.90	1.90	1.90	1.90	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	0.68	1.00	1.70	1.70	1.70	1.70	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.00	1.00	1.05	1.05	1.05	1.05	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	100.00	1.50	1.50	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	45.00	45.00	45.00	45.00	45.00	45.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	7.00	10.00	10.00	15.00	35.00	35.00	0.00	0.00	0.00	0.00
Friend	33.00	50.00	50.00	65.00	45.00	45.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	35.00	35.00	20.00	20.00	20.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7
GROUP # 2: 11,13
GROUP # 3: 8,9,10,12,14,15,16,17,18,19
GROUP # 4: 20,21,22,23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38
GROUP # 6: 39,40,41,42,43,44,45,46,47,48,49,50
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

FDCH

CATEGORY 4-5 NOVEMBER OCCUPANCY

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA01	9611					3621				
			710	2880	960	5058		269	1072	361	1916
ZONE NO	DA02	71368					27613				
			5703	18125	7136	40402		2230	6827	2761	15793
ZONE NO	DA03	3353					1248				
			239	1068	334	1709		88	395	123	637
ZONE NO	DA04	33564					13161				
			2784	7736	3355	19684		1104	2937	1315	7802
ZONE NO	DA05	43959					16760				
			3366	12286	4395	23909		1294	4595	1675	9192
ZONE NO	DA06	22365					8580				
			1743	6012	2236	12371		675	2255	857	4790
ZONE NO	DA07	19458					7616				
			1606	4545	1945	11359		635	1723	761	4494
ZONE NO	DA08	29158					13028				
			2915	14468	1471	10301		1302	6470	656	4596
ZONE NO	DA09	10709					4771				
			1070	5224	551	3861		476	2334	244	1712
ZONE NO	DA10	21470					9587				
			2146	10614	1088	7619		958	4746	484	3395
ZONE NO	DA11	13617					6851				
			1361	5675	822	5756		684	3007	394	2762
ZONE NO	DA12	53579					23652				
			5357	24693	2940	20586		2364	11014	1283	8986
ZONE NO	DA13	9592					4821				
			958	3984	580	4066		481	2111	277	1948
ZONE NO	DA14	9980					4423				
			997	4715	532	3732		441	2104	233	1639

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA15	3954					1763				
			395	1940	202	1415		175	866	89	628
ZONE NO	DA16	2636					1179				
			263	1318	131	922		117	589	58	412
ZONE NO	DA17	10490					4693				
			1049	5245	524	3671		469	2346	234	1642
ZONE NO	DA18	4322					1933				
			432	2161	216	1512		193	966	96	676
ZONE NO	DA19	18860					8426				
			1885	9352	952	6668		842	4182	424	2974
ZONE NO	DA20	8219					3667				
			1224	5259	14	1718		546	2351	5	762
ZONE NO	DA21	49536					22082				
			7364	31483	129	10555		3287	14076	50	4667
ZONE NO	DA22	16569					7411				
			2483	10758	1	3323		1110	4812	0	1485
ZONE NO	DA23	23866					10667				
			3571	15423	16	4853		1596	6899	6	2164
ZONE NO	DA24	32036					14316				
			4791	20680	25	6535		2141	9249	9	2912
ZONE NO	DA25	35081					15493				
			5095	20973	332	8678		2259	9362	128	3741
ZONE NO	DA26	8128					3547				
			1144	4469	147	2364		503	1990	57	995
ZONE NO	DA27	16761					7395				
			2428	9955	170	4204		1076	4443	66	1809
ZONE NO	DA28	548					239				
			77	304	9	155		33	134	3	65

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

DADE COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	DA29	1480					662				
			515	663	0	298		231	297	0	133
ZONE NO	DA30	667					298				
			231	297	0	135		103	133	0	60
ZONE NO	DA31	1435					642				
			499	642	0	289		223	287	0	128
ZONE NO	DA32	2182					977				
			762	980	0	437		341	438	0	196
ZONE NO	DA33	1200					536				
			416	535	0	244		186	239	0	108
ZONE NO	DA34	4311					1927				
			1505	1935	1	868		672	864	0	387
ZONE NO	DA35	3111					1391				
			1087	1398	0	623		486	625	0	278
ZONE NO	DA36	2569					1149				
			896	1152	0	516		401	515	0	230
ZONE NO	DA37	2171					970				
			757	973	1	439		338	434	0	195
ZONE NO	DA38	1585					708				
			551	709	1	321		246	316	0	143
ZONE NO	DA39	1602					716				
			558	718	0	323		249	321	0	143
ZONE NO	DA40	4658					2077				
			1604	2060	10	982		716	920	3	434
ZONE NO	DA41	3976					1778				
			1387	1783	1	801		620	797	0	357
ZONE NO	DA42	3525					1577				
			1233	1585	0	704		551	709	0	315
ZONE NO	DA43	1808					808				
			627	806	2	371		280	360	0	165
ZONE NO	DA44	555					247				
			190	244	1	118		84	108	0	52
ZONE NO	DA45	678					302				
			232	298	1	144		103	132	0	63
ZONE NO	DA46	1216					544				
			425	547	0	243		190	244	0	108
ZONE NO	DA47	1480					662				
			518	666	0	296		231	297	0	132
ZONE NO	DA48	1237					553				
			431	555	0	248		193	248	0	110
ZONE NO	DA49	426					190				
			149	191	0	85		66	85	0	38
ZONE NO	DA50	4028					1802				
			1409	1812	0	805		630	810	0	360
		628689	79138	%281894	31231	%236276	269060	34488	%123034	12652	98729

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 4-5 NOVEMBER OCCUPANCY

DADE COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	1.47	1.30	2.66	2.66	2.66	2.66	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	1.90	1.90	1.90	1.90	1.90	1.90	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	0.68	1.00	1.70	1.70	1.70	1.70	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.00	1.00	1.05	1.05	1.05	1.05	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	100.00	1.50	1.50	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	85.00	85.00	85.00	85.00	85.00	85.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	7.00	10.00	10.00	15.00	35.00	35.00	0.00	0.00	0.00	0.00
Friend	33.00	50.00	50.00	65.00	45.00	45.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	35.00	35.00	20.00	20.00	20.00	0.00	0.00	0.00	0.00
Venicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7
GROUP # 2: 11,13
GROUP # 3: 8,9,10,12,14,15,16,17,18,19
GROUP # 4: 20,21,22,23,24,25,26,27,28
GROUP # 5: 29,30,31,32,33,34,35,36,37,38
GROUP # 6: 39,40,41,42,43,44,45,46,47,48,49,50
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

TRANSPORTATION ANALYSIS

PALM BEACH COUNTY

TRANSPORTATION ANALYSIS CHAPTER

(Palm Beach Version)

Lower Southeast Florida Hurricane Evacuation Study
Technical Data Report

Prepared by

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134 South Bronough Street
Tallahassee, Florida 32301

Prepared for

Department of the Army
Jacksonville District, Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

JANUARY 1991

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Lower Southeast Florida Hurricane Evacuation Study
Palm Beach County

During a hurricane evacuation effort, it is widely recognized that a large number of vehicles have to be moved across a road network in a relatively short period of time. The number of vehicles and evacuees becomes particularly significant for an area such as Palm Beach County where major urban areas and vulnerable permanent and seasonal communities are located. The magnitude of evacuating vehicles varies depending upon the intensity of the hurricane, presence of seasonal residents and certain behavioral response characteristics of the vulnerable population.

Vehicles enter the road network at different times depending on the evacuee's response relative to an evacuation order or advisory. Conversely, vehicles leave the road network depending on both the planned destinations of evacuees and the availability of acceptable destinations such as public shelters, hotel/motel units and friends' or relatives' homes in non-flooded areas. Vehicles move across the road network from trip origin to destination at a speed dependent on the traffic loadings on various roadway segments and the ability of the segments to handle a certain volume of vehicles each hour.

The overall goals of the transportation analysis performed for the Palm Beach portion of the Lower Southeast Florida Hurricane Evacuation Study were to estimate clearance times (the time it takes to clear a county's roadways of all evacuating vehicles), to define the evacuation road network, and to look at general traffic control issues that could affect traffic flow along critical roadway segments. Clearance time is a value resulting from transportation engineering analysis performed under a specific set of assumptions. It must be coupled with pre-landfall hazards data to determine when a strong evacuation advisory must be issued to allow all evacuees time to reach safe shelter before the arrival of sustained tropical storm winds. Factors that influence clearance time must be studied intensively to determine which factors have the strongest influence.

The transportation analysis task initially identified the kinds of traffic movements associated with a hurricane evacuation that must be considered in the development of clearance times. Basic assumptions for the transportation analysis were then developed related to storm scenarios, population-at-risk, behavioral and socioeconomic characteristics, the roadway system and traffic control. A transportation modeling methodology and a roadway system representation were developed to facilitate model application and development of clearance times. General information and data related to the transportation analysis are presented in summary form in the Technical Data Report. A Transportation Model Support Document will be available through the Jacksonville District Corps of Engineers and will include a detailed account of all transportation modeling activities and zone by zone data listings for the county.

EVACUATION TRAVEL PATTERNS

Traffic movements associated with hurricane evacuation have been identified for the purposes of this analysis by five general patterns:

A. In County Origins to In County Destinations

Trips made from storm surge vulnerable areas, and mobile home units in the county to destinations within the same county, such as public shelters, hotel and motel units, and friends or relatives outside the storm surge vulnerable areas.

B. In County Origins to Out-of-County Destinations

Trips made as in category A that originate in the county but have destinations in other counties of the region or outside the region entirely.

C. Out of County Origins to In County Destinations

Trips made as in category A that enter the county from other counties in the region.

D. Out of County Origins to Out-of-County Destinations

Trips passing through the county while traveling from another county in the study area to either another county or outside the region entirely. This travel pattern is particularly significant due to the effects of Monroe, Dade and Broward traffic on the Florida Turnpike and I-95 passing through Palm Beach County during an evacuation.

E. Background Traffic

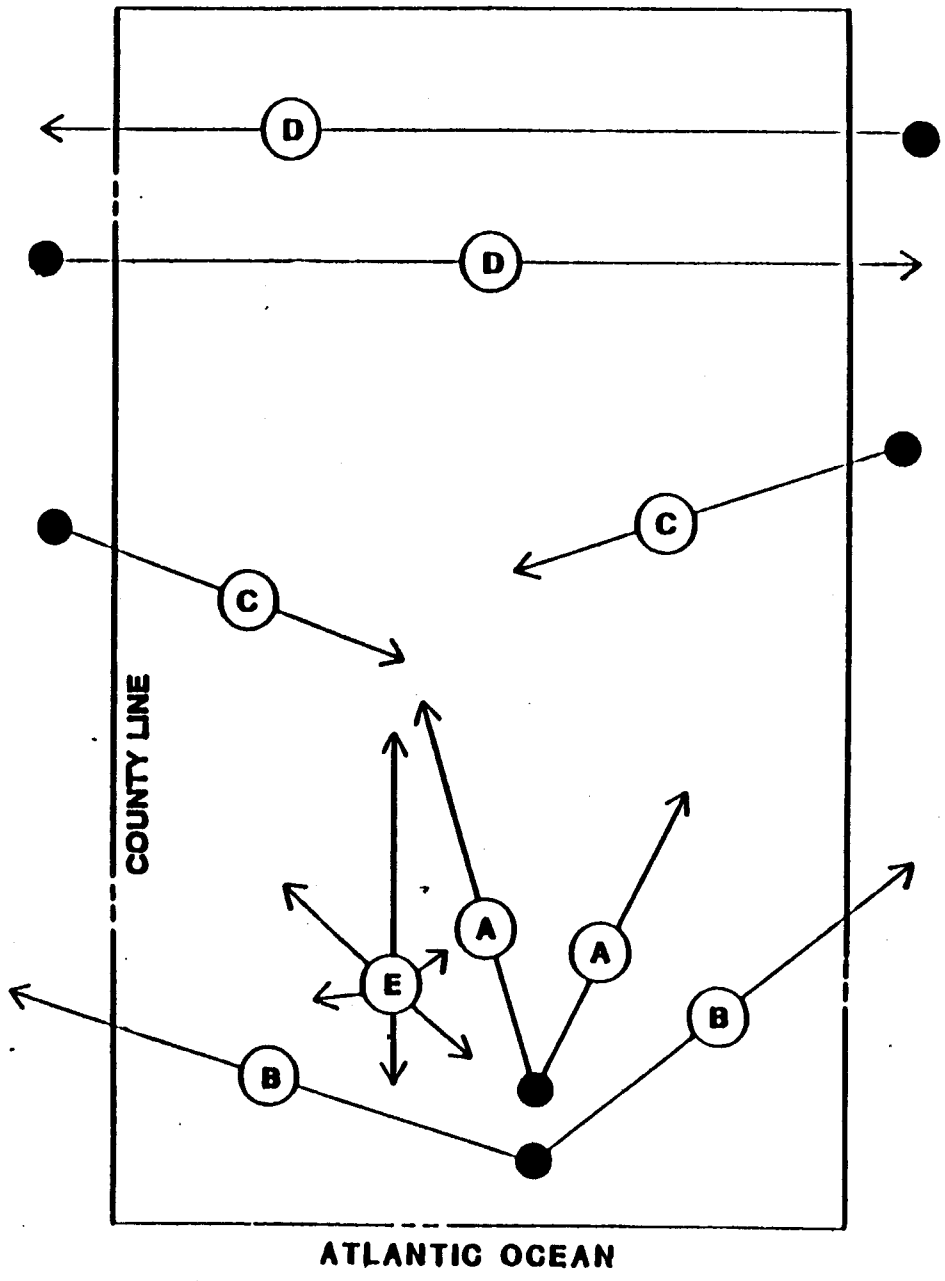
Trips made by persons preparing for the arrival of hurricane conditions; these trips may be shopping trips to gather supplies and/or trips from work to home to assist the family in evacuation. This traffic can also include transit vehicles (vans/buses) used to pick up evacuees without personal transportation.

Figure 6-1 graphically depicts these traffic movement patterns associated with hurricane evacuation situations in Palm Beach County. It is important to recognize that three of the five defined patterns involve traffic movement patterns generated outside of the county's boundaries.

TRANSPORTATION ANALYSIS INPUT ASSUMPTIONS

Since all hurricanes differ from one another in some respect, it becomes necessary to set forth clear assumptions about storm characteristics and evacuees' expected response before transportation modeling can begin. Not only does a storm vary in its track, intensity and size, but also in the way it is perceived by residents in potentially vulnerable areas. These factors cause a wide variance in the behavior of the vulnerable population. Even the time of day at which a storm makes landfall influences the time parameters of an evacuation response.

The transportation analysis results in clearance times based on a set of assumed conditions and behavioral responses. It is likely that an actual storm will differ from a simulated storm for which clearance times are calculated in this report. Therefore, a sensitivity analysis was performed during the transportation modeling. Those variables having the greatest influence on clearance time were



EVACUATION TRAVEL PATTERNS

- (A) In-County Origins To In-County Destinations
- (B) In-County Origins To Out-Of-County Destinations
- (C) Out-Of-County Origins To In-County Destinations
- (D) Out-Of-County Origins To Out-Of-County Destinations
- (E) Background Traffic

Figure 6-1

identified and then varied to establish the logical range within which the actual input assumption values might fall.

Key assumptions guiding the transportation analysis are grouped into five areas.

1. Population Data
2. Storm Scenarios
3. Evacuation Zones
4. Behavioral Characteristics of the Evacuating Population
5. Roadway Network and Traffic Control Assumptions

These five areas and their assumed parameters are described in the following paragraphs. Those parameters which were varied for sensitivity analysis are noted.

Population Data

A 1991 data base for Palm Beach County was interpolated using 1980 base year and 1995 future year data bases available through the Palm Beach County MPO. This source of data by TAZ provided a base for permanent population parameters on a sub-county basis. Since data are regularly updated for these units, their use provides a means to facilitate updating of the evacuation study in the future.

Seasonal and permanent dwelling unit data assembled by PBS&J included the following resources:

* Traffic Analysis Zonal Data Bases - Palm Beach County MPO Staff
* U.S. Census Bureau - 1980 Population and Housing Units.
* 1989 Florida Statistical Abstract
* Palm Beach County mobile home data (provided by Division of Emergency Management)

The assumed 1991 permanent population for the hurricane study was 900,000 in Palm Beach County. The associated number of permanent, mobile home, and hotel/motel/seasonal dwelling units for the county was 374,000, 15,500, and 24,000 units respectively. Estimates of vehicle ownership by sub-area were crucial to

translating hurricane vulnerable housing units to vehicle demand for roadways.

Storm Scenarios

The hazards analysis identified those storm tracks causing the worst possible and probable storm surge in Palm Beach County for each of five hurricane intensity categories (corresponding to the Saffir-Simpson scale). When five storm intensities are factored by several varying behavioral parameters, the number of hypothetical hurricane situations can quickly reach 100 or more. Calculation of clearance times for this many storm situations would be cumbersome and unusable by local emergency preparedness officials and would be inappropriate given the relative level of accuracy of hurricane storm forecasting. Storm forecasting for the period 12 to 24 hours prior to eye landfall is generally not precise enough to allow for more than 2 or 3 storm scenarios (grouping by intensity) per county.

Traffic analysis zones were compared with storm surge limits corresponding to the five hurricane categories. This procedure identified where major differences in storm surge limits and number of vulnerable population exist relative to each progressive step in hurricane intensity. The storm scenarios developed in the transportation analysis for Palm Beach County are as follows:

Storm Scenarios	Saffir Simpson Category
A	Category 1-2
B	Category 3
C	Category 4-5

Evacuation Zones

Through the SLOSH model and hazards analysis, those areas which will receive hurricane storm surge were identified and graphically shown on the storm surge atlases provided by the State of Florida. This information became one of the key inputs to the transportation analysis. Those residents who must evacuate as well as those residents who should not necessarily evacuate were defined.

Within the transportation analysis it was assumed that persons living in areas flooded by storm surge should be evacuated. This evacuee group included

permanent residents living in single-family, multi-family, or mobile home units, as well as tourists staying in hotel/motel seasonal units located in storm surge vulnerable areas. In addition, mobile home residents living outside the hurricane flooded areas of each county were assumed to evacuate due to high wind vulnerability.

Having established those persons who should evacuate during a particular storm situation, it was then necessary to develop a series of zones to geographically locate and quantify the vulnerable population. Evacuation zones also provide a base to model traffic movements from one geographic area to another. A series of zones was established based on the following factors:

* Zones should relate to expected surge flooding limits (based on Maximum Envelope of Water - MEOWs) for each storm scenario.
* Zones should relate well to traffic analysis zone, census, enumeration district or other data base unit.
* Zones should be set up, if possible, for ease of use in issuing an evacuation order or advisory.
* Zonal boundaries should include identifiable natural features, roadways, landmarks, etc.
* Small "pocket" zones that would be isolated by surrounding surge should be avoided.
* Zones should be able to be served by major evacuation routes.
* Zones should have relatively balanced population levels.
* Zones must allow for appropriate transportation modeling.

For Palm Beach County 53 zones were set-up. The first 11 zones cover the Category 1-2 surge area. The next ten zones (zones 12-21) cover the Category 3 additional surge area. Zones 22 through 24 cover the Category 4-5 additional surge area. The remaining zones 25 through 53 cover the "wind-only" vulnerable area. Appendix A to the Technical Data Report illustrates the evacuation zones established in Palm Beach County for the transportation analysis.

Behavioral Assumptions

Recognizing that the future evacuation of an endangered population due to a hurricane approaching the Lower Southeast Florida study area involves the

coordinated action of thousands of individuals, the Jacksonville District Corps hired Hazards Management Group to gather detailed information through a behavioral analysis pertaining to the tendencies and intended choices of the evacuation population.

PBS&J reviewed these data to derive the best assumptions possible for the transportation analysis. Specifically, for transportation purposes, the following behavioral aspects were addressed:

* Occupancy of hotel/motel units
* Participation rates
* Evacuation rates
* Destination desires
* Vehicle usage

As a hurricane approaches the study area, the number of tourists who may be required to evacuate along with the permanent residents could be significant.

Hotels along the barrier island in Palm Beach County are required to have an evacuation plan for moving seasonal residents to safety. For the transportation analysis, two levels of seasonal occupancy were tested in Palm Beach County (45% and 90% occupancy levels of identified seasonal units).

Another important behavioral aspect is that of participation rates. Participation rates of those residing in surge flooded zones generally varies between 30 to 90 percent depending on a zone's proximity to the waterfront or coastline. Generally, a 90 to 100 percent participation by those evacuees living in mobile homes outside the surge flooded areas can be assumed. However, for the Palm Beach study area local officials felt it would be best to base the clearance time calculations on 100% participation by surge vulnerable residents and mobile home residents. This planning assumption proved to be prudent in other study areas such as South Carolina during the Hugo situation. In addition, a small percentage (½ to 2% depending on storm intensity) of the theoretical non-vulnerable population was assumed to evacuate their dwelling units in the county. The Transportation Model Support Document provides a listing of all participation rates assumed by zone by storm scenario for the county.

One of the most critical behavioral aspects that must be considered for the transportation analysis is the evacuation rate of the evacuating population. Behavioral data from research of past hurricane evacuations show that mobilization and actual departures of the evacuating population occur over a period of many hours and sometimes several days. For the Lower Southeast Florida study, clearance times were tested for three evacuation rates represented by different behavioral response curves. Behavioral response curves describing mobilization by the vulnerable population define the rate at which evacuating vehicles load onto the evacuation street network for each hourly interval relative to an evacuation order or strong advisory. The percentage of evacuees leaving dwelling units is then available for the calculations relating to traffic loadings at critical links along the evacuation network. The behavioral response curves shown in Figure 6-2 range from rapid response to slow response and are representations of possible mobilization times that might be experienced in a future hurricane evacuation situation. For sensitivity analysis, the mobilization/traffic loading time was varied between three hours and nine hours.

The percentage of evacuees assumed to go to one of four general destination types was another important behavioral input to the transportation analysis. Evacuee destination percentages were discussed with local disaster preparedness officials after careful review of information available in past behavioral research. Figures were developed for the expected percent of evacuees going to public shelters, hotel/motel units, the home of a friend or relative, or out of the county entirely. Destination percentages were varied for each evacuation zone in the county depending on category of risk (distance from coastline) or special characteristics of a zone such as high number of substandard housing units or low income residents. Specific assumptions for each scenario and evacuation zone are provided in the Transportation Model Support Document.

A final behavioral assumption refers to vehicle usage and the percent of households expected to pull a trailer or recreational vehicle during an evacuation. Vehicle usage percentages refer to the percent of vehicles available at the home origin that are assumed to be used in the evacuation. Vehicle usage percentages were approximately 65% to 75% (depending on distance from the coastline) for the Lower Southeast Florida study transportation analysis. The percent of households expected to pull a boat, trailer or RV was approximately 1-5 percent in the immediate coastal area zones.

BEHAVIORAL CUMULATIVE EVACUATION CURVES

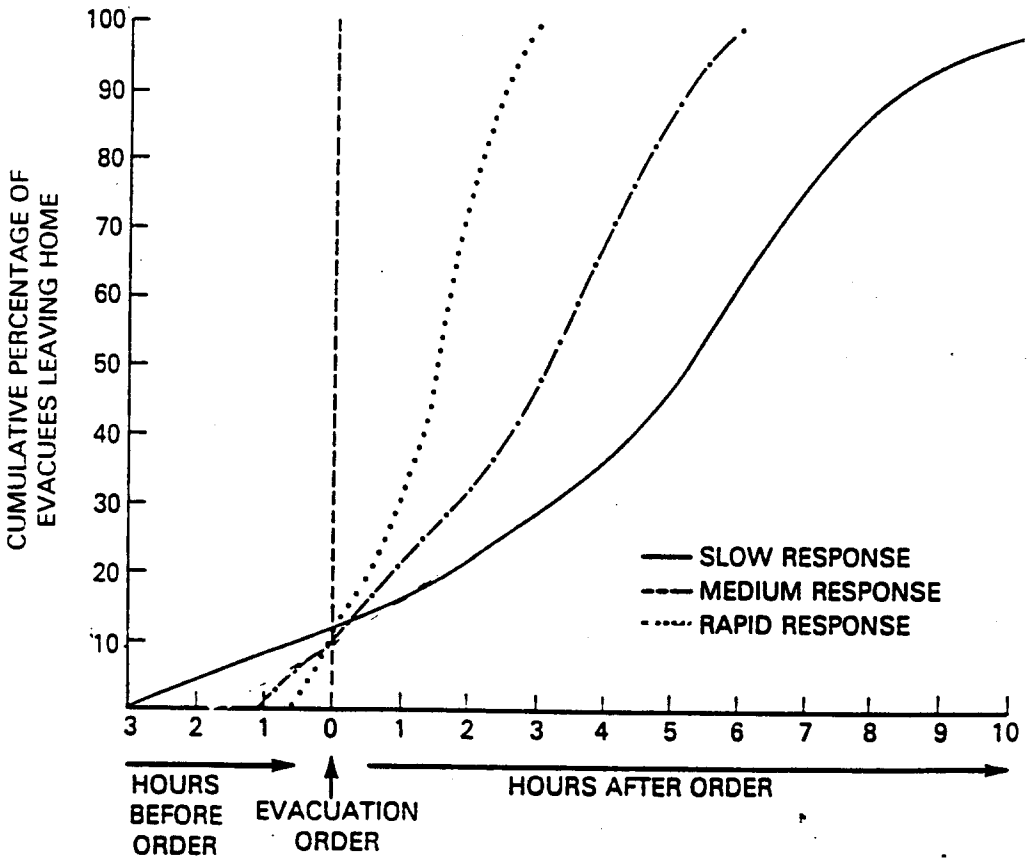


Figure 6-2

Roadway Network and Traffic Control Assumptions

A final group of assumptions used for input to the transportation analysis related to the roadway system chosen for the evacuation network and traffic control measures selected for traffic movement. Although the assumptions developed for the transportation analysis are general, the efforts at state, county and municipal levels regarding traffic control and roadway selection must be quite detailed. Detailed manpower allocations to major intersections, interchanges, and bridges involve extensive coordination among local and state officials. This study does not presume to replace those efforts, but seeks to quantify the time elements within which such manpower would operate.

In choosing roadways to be used for an evacuation network, an effort is made to include street facilities with sufficient elevations, little or no adjacent tree coverage, substantial shoulder width and surface, and roadways already contained in existing hurricane evacuation plans. Another objective is to include east-west arterials and bridge combinations that would provide the smoothest (least disjointed) possible traffic flow.

In order to determine the routing of evacuation traffic a representation of the roadway system was developed. A traditional "link-node" system was developed to identify roadway sections. Nodes are used to identify the intersection of two roadways or changes in roadway characteristics. Links are the roadway segments as defined by the nodes when connected. Each link is identified by a letter designation.

Once the links and nodes for the evacuation routes were identified, roadway characteristics were specified for each link. The characteristics of each link were defined by the following features.

* Number of travel lanes
* Type of facility

Appendix A to the Technical Data Report illustrates the roadway system representations (evacuation networks) for each county in the study area. The significance of link node segments and zone connectors (dashed lines) is explained in the Transportation Model Support Document. The figures consist of base maps

showing all the major streets in the study area with identification of the nodes and centroid connectors in color. Detailed roadway link information is contained in the Transportation Model Support Document.

An important assumption for the transportation modeling was that all drawbriges would be locked down and open to vehicular traffic during a Hurricane Warning period. U.S. Coast Guard regulation 33-117.1(c) may give Civil Defense authorities the ability to implement this procedure. At the present time, request for closure prior to a major disaster occurring (and prior to the warning period) must be directed to the Coast Guard. The Coast Guard, however, has the capability of acting on these requests immediately. It is essential that appropriate bridge regulations be interpreted and implemented to allow for immediate response to an evacuation order. It may be prudent in some areas for boat owners to find safe harbor prior to or during a Hurricane Watch period. The lives of citizens evacuating in vehicles could be at risk if bridges are not allowed to operate at near full capacity during a Hurricane Warning. Bridge openings obviously result in less than full hourly capacity for vehicular movement.

It was assumed that special manpower (state police, local policemen, sheriffs, deputies), will be assigned to critical intersections in the study area. This would allow for smoother traffic flow and would allow east-west traffic movements more intersection "green time." The transportation modeling task also assumes that provisions would be made for removal of vehicles in distress during the evacuation. This may require that agreements with tow-truck operators be worked out in local planning efforts. Tow trucks could possibly be stationed at critical bridge segments and other roadway locations.

Assumptions concerning the road network are that the evacuation of all vehicles will occur prior to the arrival of sustained tropical storm winds (39 mph) and storm surge inundation. Due to the vulnerability of some local roadways to rainfall flooding, some segments may become impassable before the arrival of hurricane related hazards such as storm surge and gale force winds.

In summary, data inputs to the transportation analysis can be classified into one of four categories:

* Hazards Data

* Socioeconomic Data
* Behavioral Data
* Roadway Network

Table 6-1 provides a listing of each major data input for each of the four categories.

OVERVIEW OF TRANSPORTATION MODELING METHODOLOGY

The work tasks involved in performing the transportation analysis are illustrated in Figure 6-3. In addition to the front end development of population data, evacuation zones, and scenarios, the diagram provides the transportation modeling steps in the upper right hand box.

The transportation modeling methodology developed and employed for the Lower Southeast Florida Study Area involved a number of manual and microcomputer techniques. The methodology, while very technical, was designed to be consistent with the accuracy level of the modeling inputs and assumptions. The methodology is unique in that it is sensitive to the key behavioral aspects of evacuees.

The Transportation Model Support Document specifies and explains the steps carried out in the transportation modeling at a detailed technical level. In summary, the modeling methodology involved seven major steps. These steps are briefly described below:

1. Evacuation Zonal Data Development - Data by traffic analysis zone (TAZ) were stratified by evacuation zone. Numbers of permanent residential dwelling units, mobile homes, and tourist units were compiled by zone and formatted for input into trip generation.

2. Evacuation Road Network Preparation - This step involved developing information for those roadways selected for inclusion in the evacuation road network. Information was coded into a "link file" for use by the assignment computer module. The end product of the step was a computerized representation of the roadway system.

3. Trip Generation - Specific dwelling unit variables were used in the trip generation calculations to produce total evacuating people and vehicles originating from each evacuation zone. Originating vehicles and people were stratified by destination type based on behavioral and population parameters

TABLE 6-1

Transportation Analysis Data Inputs

Hazards Data

* Land Areas Flooded for each Category Hurricane
* Public Shelter Useability by Hurricane Category
* Time of Arrival of Gale Force Winds/Roadway Inundation

Behavioral Data

* Rapidity of Response
* Participation Rates
* Destination Percentages
* Vehicle Usage
* Percent Pulling Trailer/Boat
* Presence of Tourists

Socioeconomic Data

* Housing Unit Data
* People Per Housing Unit
* Vehicles Per Housing Unit
* Occupancy Information

Roadway Network

* Number of Lanes by Link
* Facility Types by Link (function of roadway)
* Drawbridge Operations
* Traffic Count Data
* Elevation - "Low Spots"
* Critical Links/Intersections Capacity Data

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WORK FLOW DIAGRAM

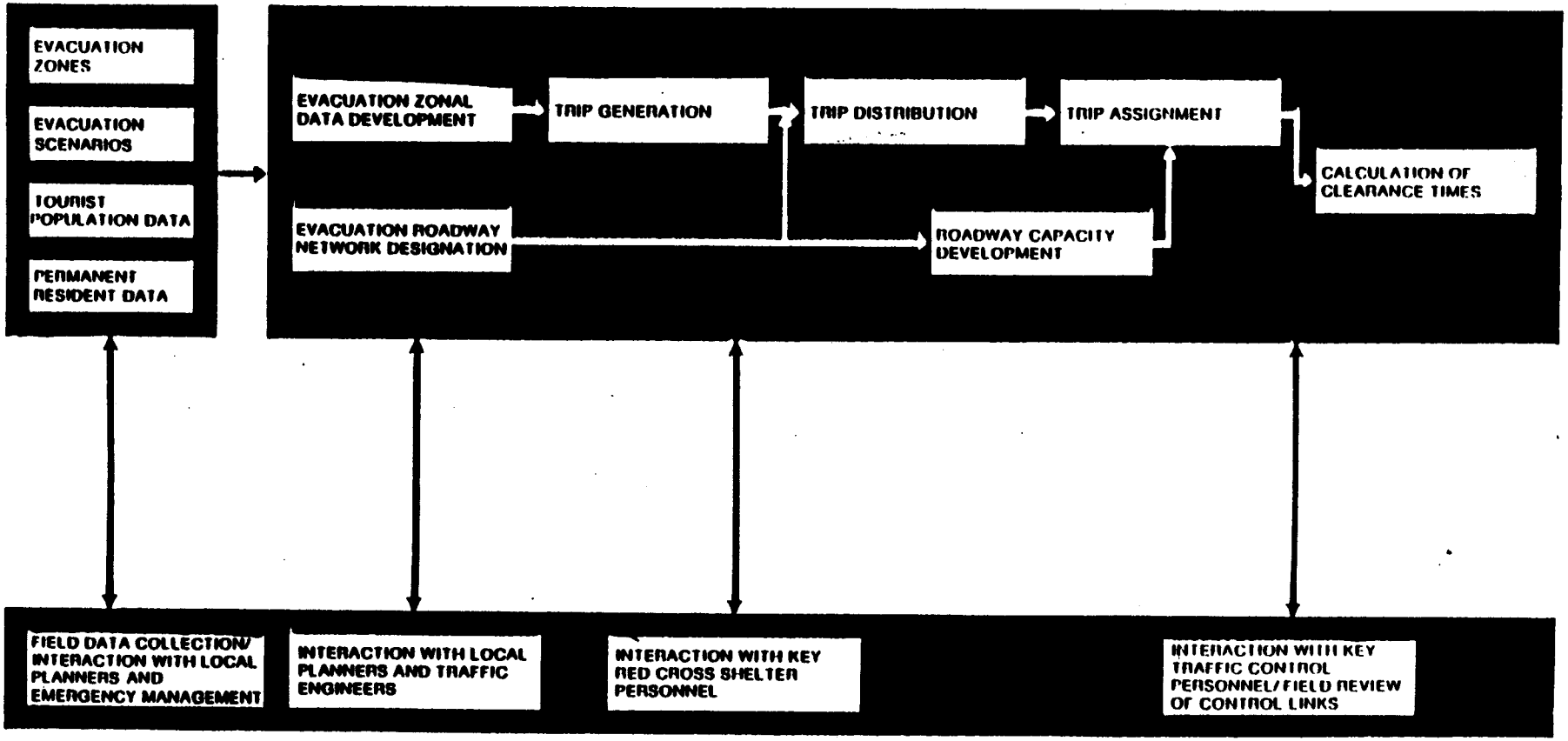

Figure 6-3

previously established. Hotel/motel information coupled with public shelter capacity information were used to develop estimates of the number of evacuating vehicles that would find acceptable destinations in each zone.

4. Trip Distribution - This step concentrated only on those trips originating in a county and finding acceptable destinations within the same county. Productions from each zone were matched with available attractions in all zones. The end product of the step was a trip table showing trips between each zone and all other zones for each evacuation destination type. A unique trip table was developed for each storm scenario, and for each tested behavioral assumption.

5. Roadway Capacity Development - Number of lanes and facility type information for each roadway link in the evacuation network were translated into a general hourly service volume for comparative purposes. Specific hourly flow rates were then developed for the most critical roadway segments and intersections after thorough field review.

6. Trip Assignment - This step included the use of another microcomputer program to assign zone to zone trips onto the road segments included in the computerized roadway system. All other categories of evacuation travel patterns (in-county to out-of-county, out-of-county to in-county, out-of-county to out-of-county, and background) were then added in to arrive at total evacuation vehicles per roadway segment. This step then developed a series of volume to capacity ratios to determine which roadway segments would be most congested by evacuation vehicles. Those links with the highest volume to capacity ratio were identified for each county.

7. Calculation of Clearance Times - Travel Time/Queuing Delay Analysis - This step involved a detailed look at the critical links and intersections identified for the eighteen jurisdictions of the study area. Initially, evacuation zones using the critical link of interest were identified. Evacuation vehicles from each zone were then released to the network in accordance with a behavioral response curve. Based on assumed hourly flow rate for the critical link, the hourly volume desiring to use the link was then translated into a queuing delay time at the link and an evacuation travel time. The end product of this major step was a set of clearance times for each storm scenario.

MODEL APPLICATION

Application of the transportation modeling methodology produced several key data items for hurricane evacuation planning and preparedness. Completion of the transportation modeling produced the following:

1. Evacuating people and vehicle parameters
2. Shelter demand and capacity considerations
3. Traffic volumes and critical roadway segments
4. Estimated clearance times

Although many pieces of information are produced in the transportation analysis, these data items are most critical to planning shelter needs, and defining the timing requirements of an evacuation.

Evacuating People and Vehicle Parameters

Using a microcomputer process, total evacuating vehicles and people produced by each zone were split by destination type (public shelter, hotel/motel unit, friend or relative's home, or out of the county). This was accomplished for each storm scenario and further refined by assumed behavioral characteristics of the population-at-risk. The Transportation Model Support Document provides this data for the evacuation zones of Palm Beach county.

Table 6-2 provides the number of evacuating people for Palm Beach County. The number of people evacuating and vehicles expected to be utilized in hurricane evacuations are given in a range due to the effect of testing different storm scenarios and tourist unit occupancies. Thus, the highest number relates to a high seasonal occupancy and the most severe hurricane storm category. Figures are based on 1991 population estimates and previously discussed behavioral aspects of vulnerability areas relating to the Maximum Envelope of Water limits for all hurricane directions and speeds. It is important to remember evacuating people figures include mobile home residents and a small percentage of persons who will evacuate although theoretically not vulnerable.

Shelter Demand/Capacity Considerations

After matching evacuee's destination desires with available shelters, the transportation analysis revealed that hotel/motel space will not be as widely available within the county as perceived by the evacuating population. For transportation modeling purposes, those evacuees unable to be accommodated by study area hotel/motel space were assumed to find hotel/motel space outside the study area.

Table 6-2 in addition to total evacuating people statistics, provides the calculated public shelter demand by storm scenario. Shelter space is generally adequate in Palm Beach County for in-county demand during a hurricane. The

TABLE 6-2

PALM BEACH COUNTY
EVACUATING PEOPLE STATISTICS
Lower Southeast Florida Hurricane Evacuation Study

Storm Scenario	People Evacuating Dwelling Units	People Going to Public Shelter
Category 1-2 Hurricane low seasonal occupancy	133,000 (129,100 from surge zones and mobile homes) (3,900 from "non vulnerable" units)	17,500
Category 1-2 Hurricane high seasonal occupancy	137,800 (133,750 from surge zones and mobile homes) (4,050 from "non vulnerable" units)	18,000
Category 3 Hurricane low seasonal occupancy	207,200 (199,900 from surge zones and mobile homes) (7,300 from "non vulnerable" units)	27,400
Category 3 Hurricane high seasonal occupancy	214,900 (207,450 from surge zones and mobile homes) (7,450 from "non vulnerable" units)	28,200
Category 4-5 Hurricane low seasonal occupancy	227,000 (212,700 from surge zones and mobile homes) (14,300 from "non vulnerable" units)	31,700
Category 4-5 Hurricane high seasonal occupancy	234,850 (220,200 from surge zones and mobile homes) (14,650 from "non vulnerable" units)	32,500

Key Assumptions

1991 base year population - 900,000

Occupancy of tourist/seasonal units - two levels (45% and 90%)

Figures include 100% of permanent and seasonal residents in zones colored blue and all mobile home residents for Category 1-2, additional residents in yellow zones for Category 3, and additional residents in pink zones for Category 4-5 - a small portion (1-2%) of the theoretically non-vulnerable population was also included in each scenario.

Assumed percent of evacuees to public shelter was varied by evacuation zone and storm scenario depending on a zone's distance from the coastline and general income level - for example, high income barrier island zone's figures were only 5 to 10 percent while "mobile home only" zones were 30 to 35 percent in this regard.

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available capacity of _____ people can handle the range of 17,500 to 32,500 public shelter evacuees expected.

Traffic Volumes and Critical Roadway Segments

The Transportation Model Support Document provides the assigned evacuating vehicle figures by scenario for all roadway segments in the county's evacuation network. In addition, the model document provides the volume to capacity ratios calculated for each link. Those roadway segments with the highest volume to capacity ratios were identified as the critical links for each scenario. Table 6-3 lists the critical roadway segments. Critical links and intersections are listed in order of severity. These links control the flow of evacuation traffic during a hurricane evacuation and are key areas for traffic control and monitoring.

Estimated Clearance Times

The most important product of the transportation analysis is the clearance times developed by storm scenario. Clearance time is one of two major considerations involved in issuing an evacuation or storm advisory. Clearance time must be weighed with respect to the arrival of tropical storm winds to make a prudent evacuation decision. Figure 6-4 illustrates these two timing issues of evacuation and their relation.

Clearance time is the time required to clear the roadways of all vehicles evacuating in response to a hurricane situation. Clearance time begins when the first evacuating vehicle enters the road network (as defined by a hurricane evacuation behavioral response curve) and ends when the last evacuating vehicle reaches an assumed point of safety. Clearance time includes the time required by evacuees to secure their homes and prepare to leave (referred to as mobilization time), the time spent by evacuees traveling along the road network (referred to as travel time), and the time spent by evacuees waiting along the road network due to traffic congestion (referred to as queuing delay time). Clearance time does not relate to the time any one vehicle spends traveling on the road network.

TABLE 6-3

CRITICAL ROADWAY SEGMENTS
Palm Beach County
Lower Southeast Florida Hurricane Evacuation Study

Florida Turnpike (north of Glades Road to Martin County line)
I-95 (north of N.W. 51st Street in Boca Raton)
Indiantown Road west of Old Dixie Highway
Southern Boulevard over the ICW
PGA Boulevard and U.S. 1 intersection
Atlantic Avenue through Delray Beach
Camino Real from A1A to U.S. 1 in Boca Raton
Linton Boulevard from A1A to I-95
Royal Palm Bridge/Okeechobee Boulevard and U.S. 1 intersection
10th Avenue North at I-95
(All drawbridges)
(All northbound on ramps to Florida Turnpike and I-95)

COMPONENTS OF EVACUATION TIME

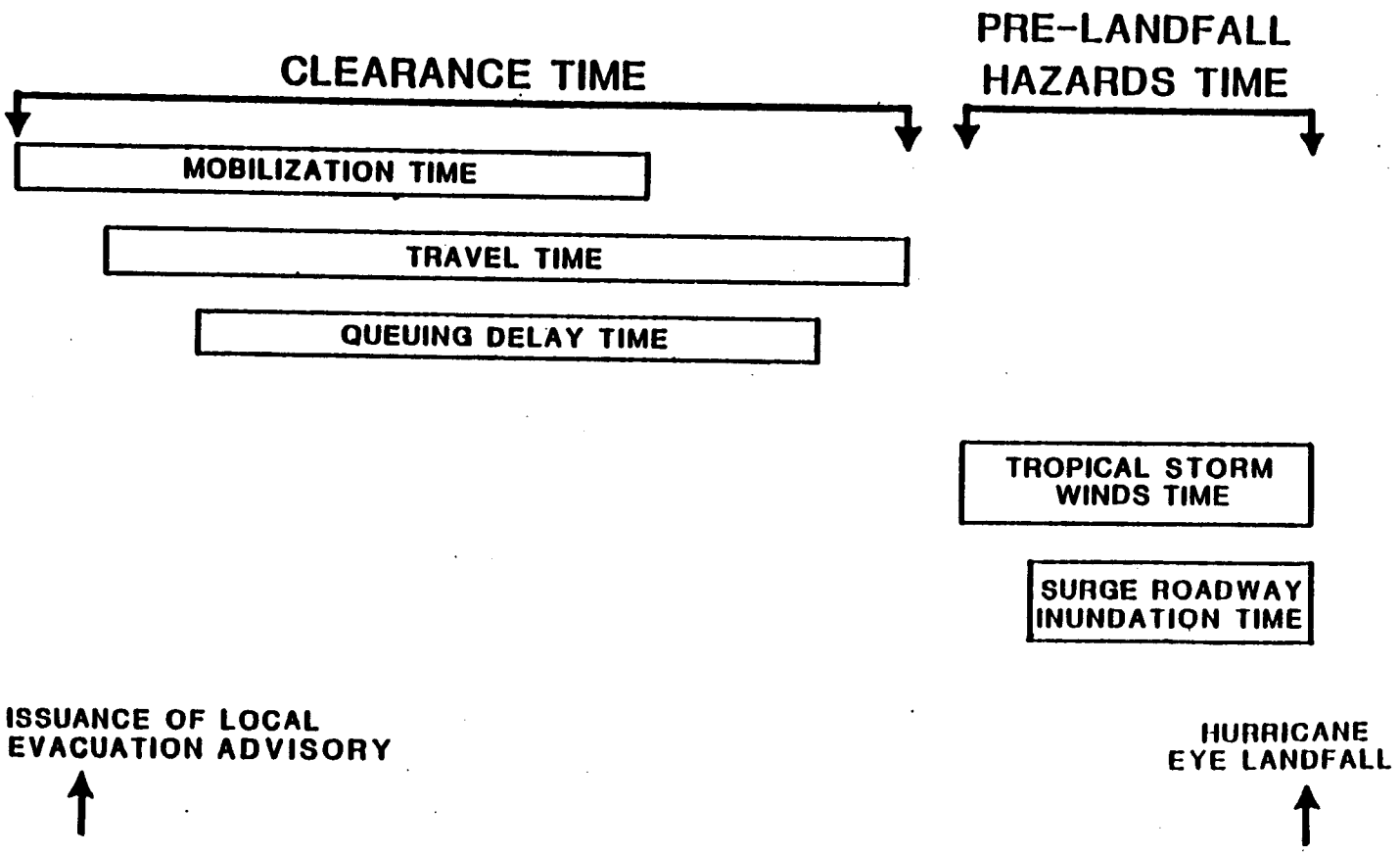


Table 6-4 presents the clearance times estimated for Palm Beach County. Clearance times are stratified by intensity of hurricane (storm scenario), by rate of response on the part of the evacuating population, and by level of seasonal occupancy. Clearance times are presented for local (only) movements as well as for traffic on the Florida Turnpike or I-95. The times for regional facilities are significant in length and could be much higher as Treasure Coast evacuees from Martin, St. Lucie, and Indian River counties are not factored in. It is important to note that clearance times are based on the assumptions that local officials will attempt to evacuate residents out of dwelling units located in the areas shown as flooded by storm surge (by the SLOSH model). The hazards analysis chapter of the Technical Data Report defines these surge limits and the theory behind their derivation.

TRAFFIC CONTROL ISSUES

The movement of evacuating vehicles during hurricane evacuation requires extensive traffic control efforts to make maximum use of roadway capacity and to expedite safe escape from hurricane hazards. The development of traffic control techniques for critical evacuation roadway links and intersections should always be developed by local police, state highway patrol, state departments of transportation, local traffic engineers, emergency management personnel and the U.S. Coast Guard working together cooperatively. The following traffic control issues are recommended for consideration:

1. The large number of vehicles expected to accumulate on the Florida Turnpike and I-95 during a major hurricane threat necessitates that the State of Florida address multi-regional evacuation movements, reverse lane strategies, and inland shelter supplies/staffing issues (particularly in Orlando).

2. All available tow trucks should be positioned or on call along key travel corridors and critical links. At a minimum, tow trucks should be at major bridge crossings to remove disabled vehicles.

3. Where intersections will continue to have signalized control, signal patterns providing the most "green time" for the westbound approach leading away from the coast should be actuated by the local traffic engineer's office as appropriate.

4. All draw/swing bridges needed for evacuation should be locked in the "down" position during a hurricane warning if possible. Boat owners must be made aware of flotilla plans and time requirements for securing vessels. Optimally, recreational vehicles should be moved to safe harbor during or before a hurricane watch. This judgement will need to be made on a case by case basis through discussions between the U.S. Coast Guard, and local emergency officials.

5. Once a hurricane warning is posted for counties in Southeast Florida, toll collections on the Florida Turnpike should be suspended. If bonding requirements do not allow for this, this action could be achieved by the Governor ordering toll attendants to leave their toll booths and go home to prepare for the storm.

TABLE 6-4

CLEARANCE TIMES
Palm Beach County
Lower Southeast Florida Hurricane Evacuation Study

(Local Evacuation Movements Not Involving Florida Turnpike or I-95)

Category 1-2 Hurricane	Summer Seasonal Occupancy	Late Fall/November Seasonal Occupancy
Rapid Response	6	6½
Medium Response	7¼	7¾
Slow Response	9½	10
Category 3 Hurricane		
Rapid Response	9¼	9¾
Medium Response	11	11¾
Slow Response	13½	14½
Category 4-5 Hurricane		
Rapid Response	11	11¾
Medium Response	12¾	13¾
Slow Response	15¼	16½

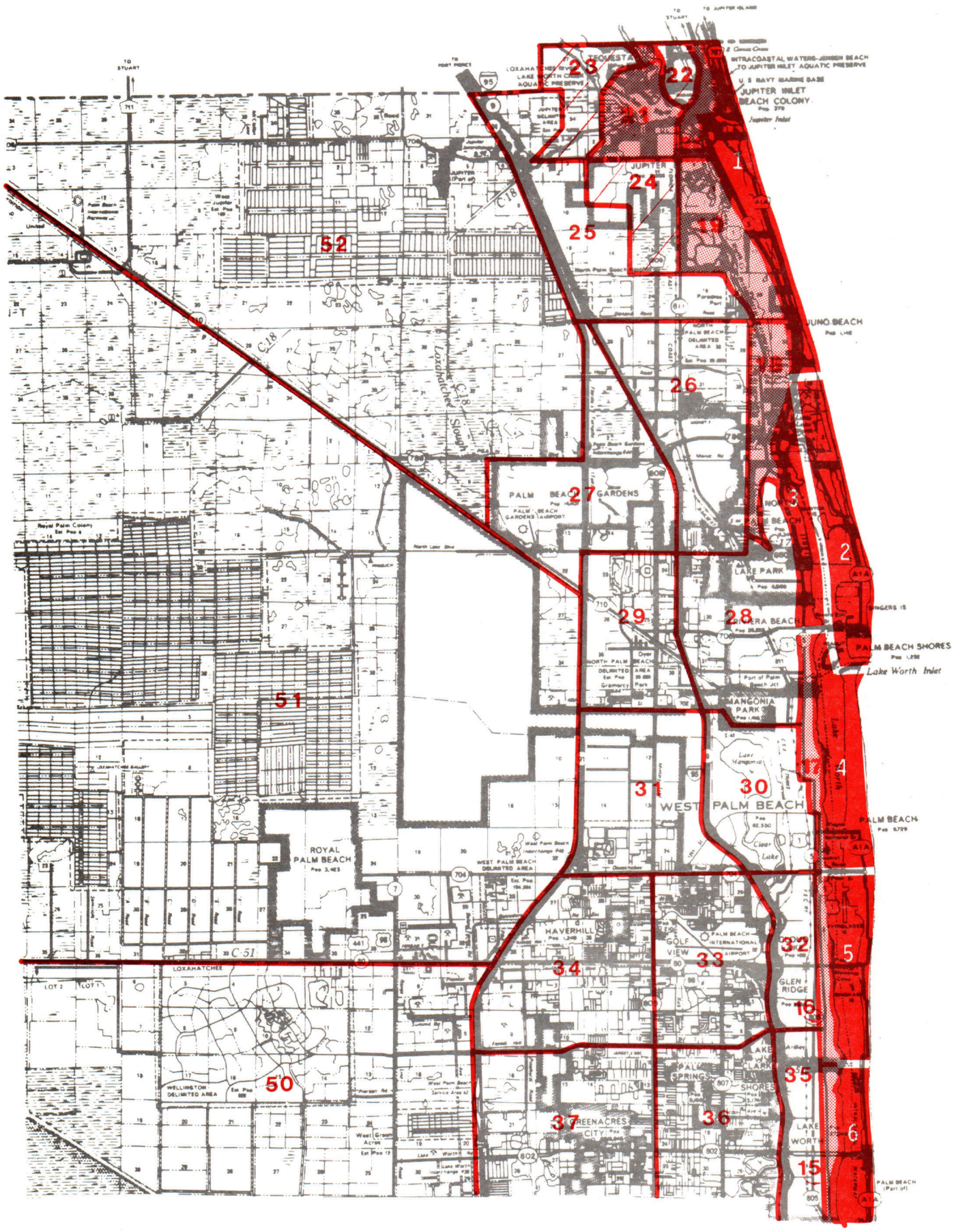
TABLE 6-4

CLEARANCE TIMES*
Palm Beach County
Lower Southeast Florida Hurricane Evacuation Study

(Florida Turnpike/I-95 Evacuation Movements)

Category 1-2 Hurricane	Summer Seasonal Occupancy	Late Fall/November Seasonal Occupancy
Rapid Response	15¼	19¼
Medium Response	15½	19¾
Slow Response	16¼	20¼
Category 3 Hurricane		
Rapid Response	24¼	29
Medium Response	24¾	29¼
Slow Response	25¼	30
Category 4-5 Hurricane		
Rapid Response	36½	41¼
Medium Response	37	41¾
Slow Response	37½	42¼

* Clearance times reflect accumulation of Monroe, Dade, Broward and Palm Beach County out of county movements on the Florida Turnpike and I-95. Times could be worse than these "upstream" as Treasure Coast evacuees attempt to evacuate out of county.



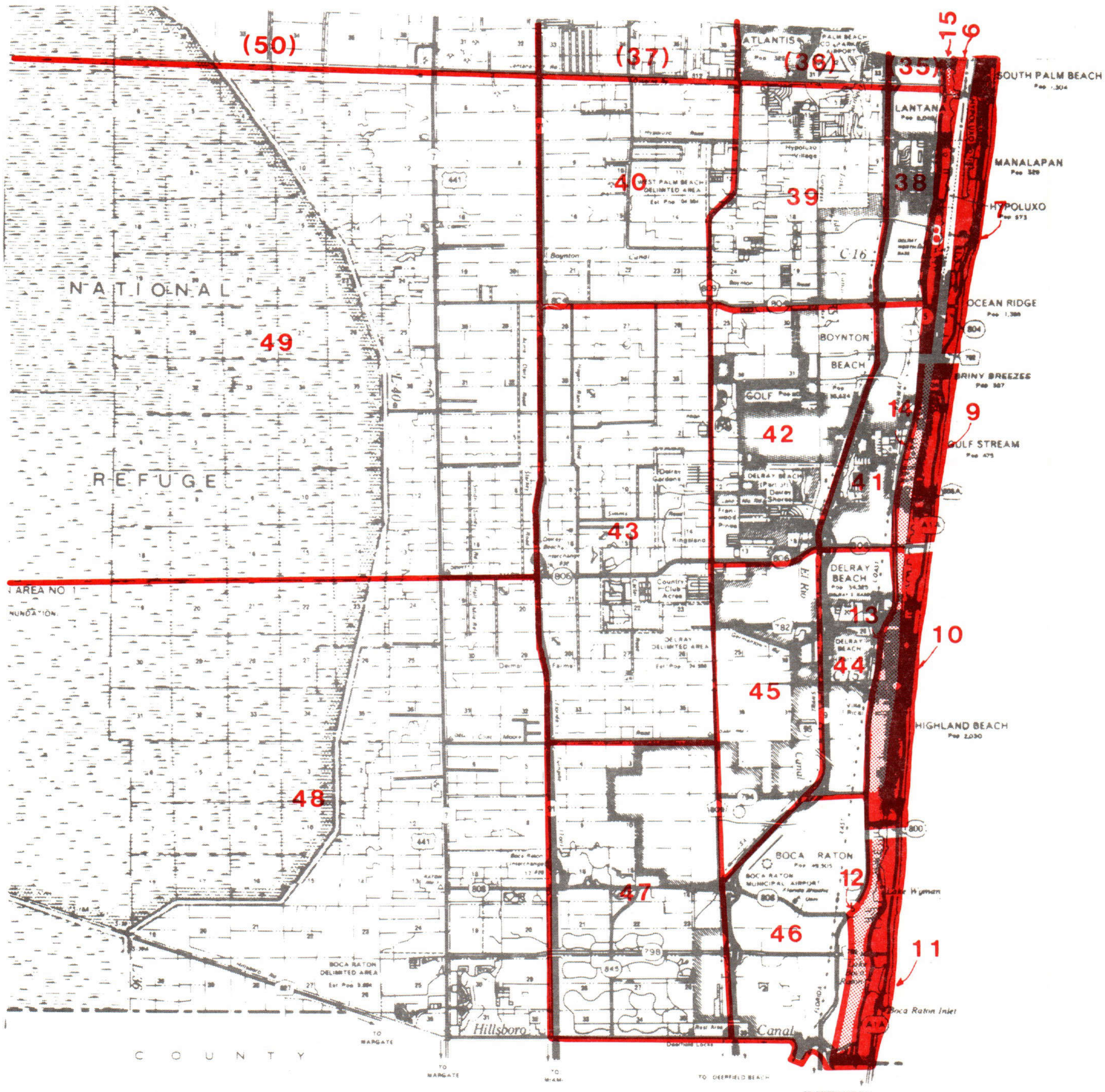
Legend

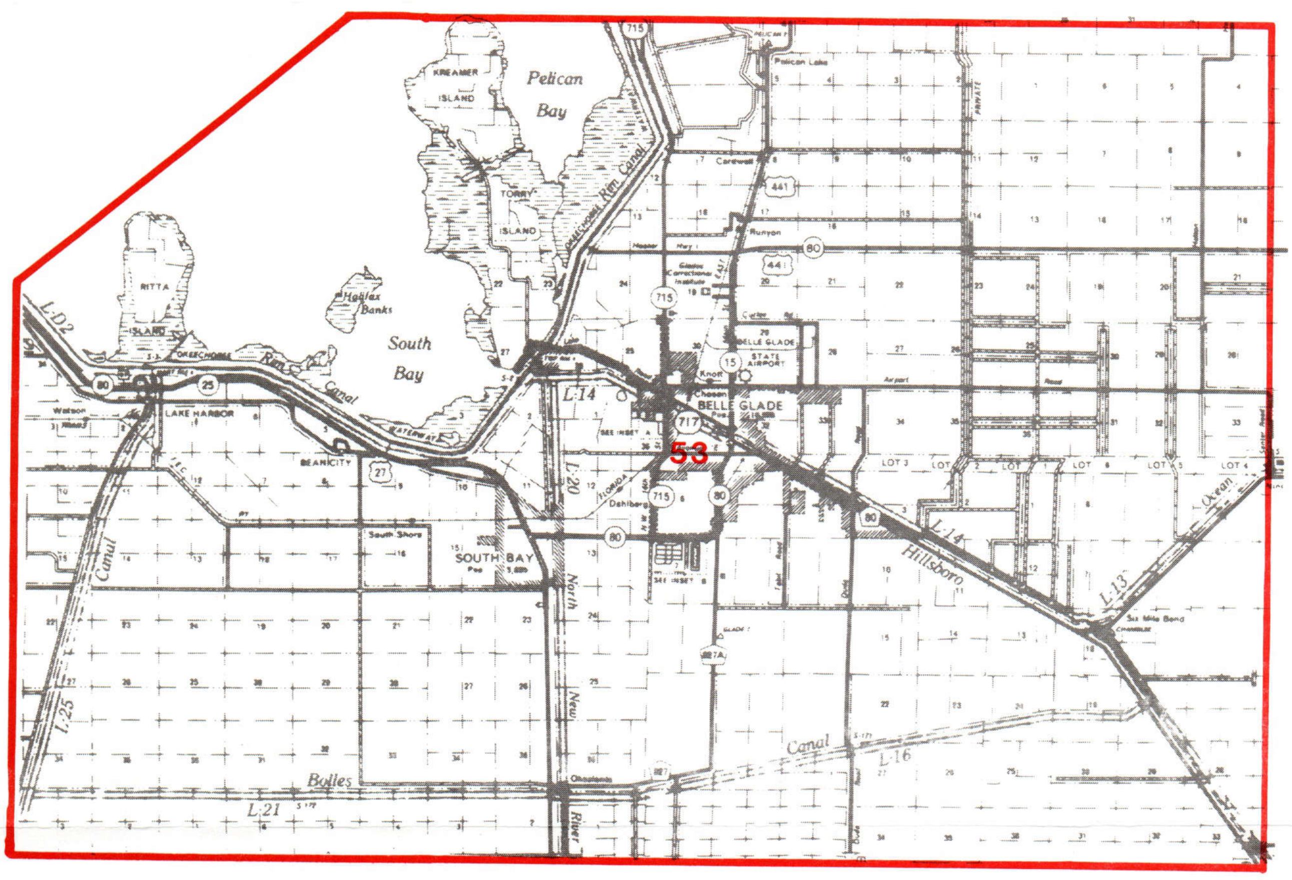
- CATEGORY 1-2 SURGE AREA
- CATEGORY 3 ADDITIONAL SURGE AREA
- CATEGORY 4-5 ADDITIONAL SURGE AREA

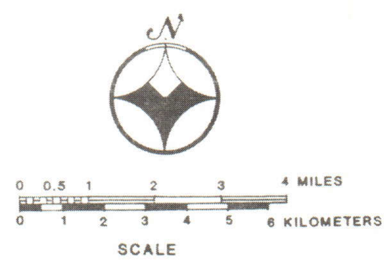
NORTH PALM BEACH COUNTY

VULNERABLE AREAS AND EVACUATION ZONES

1 OF 2







2 OF 2

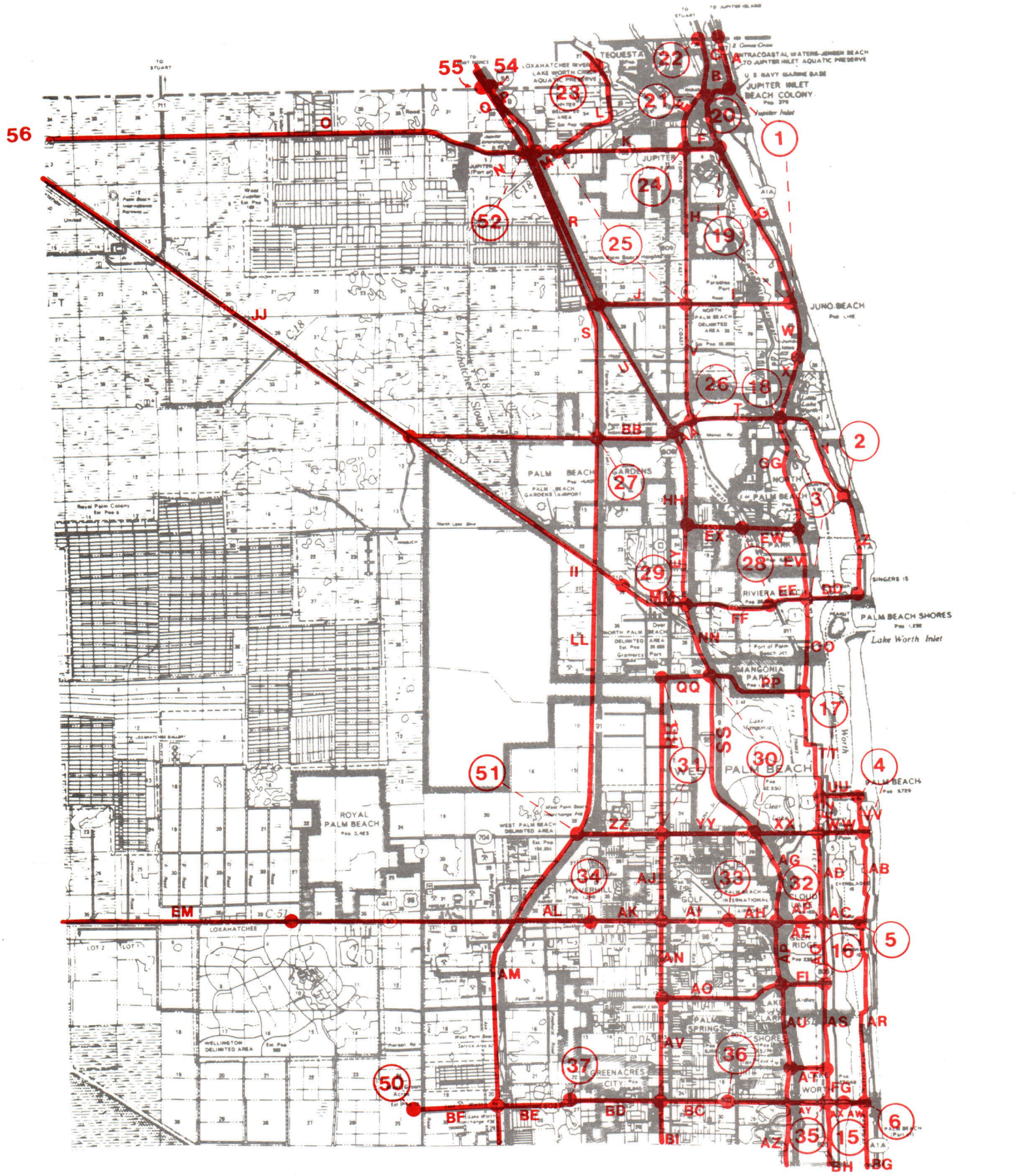
Legend

CATEGORY 1-2 SURGE AREA

CATEGORY 3 ADDITIONAL SURGE AREA

SOUTH PALM BEACH COUNTY
AND BELLE GLADE

**VULNERABLE AREAS
AND
EVACUATION ZONES**



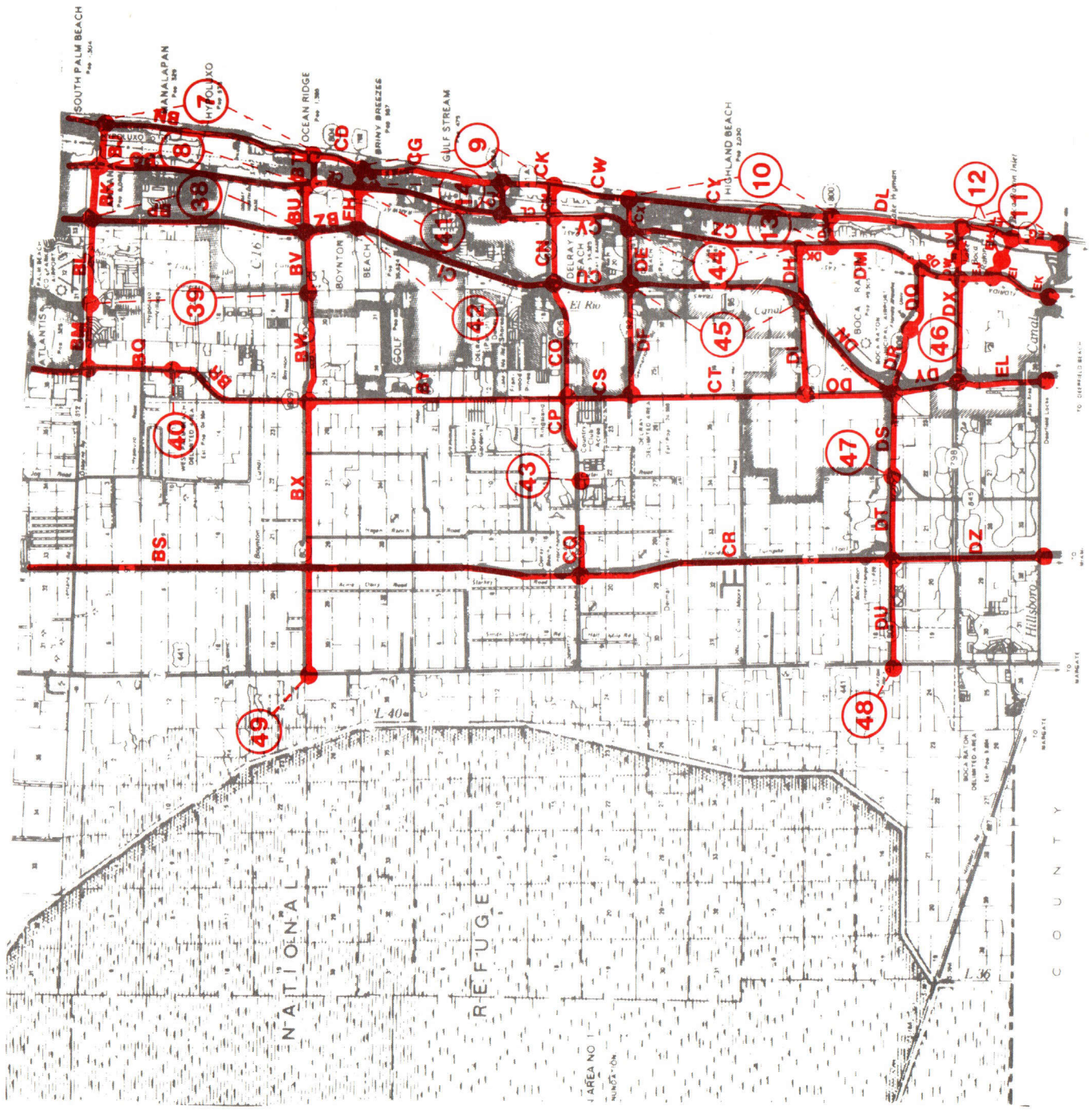
Legend

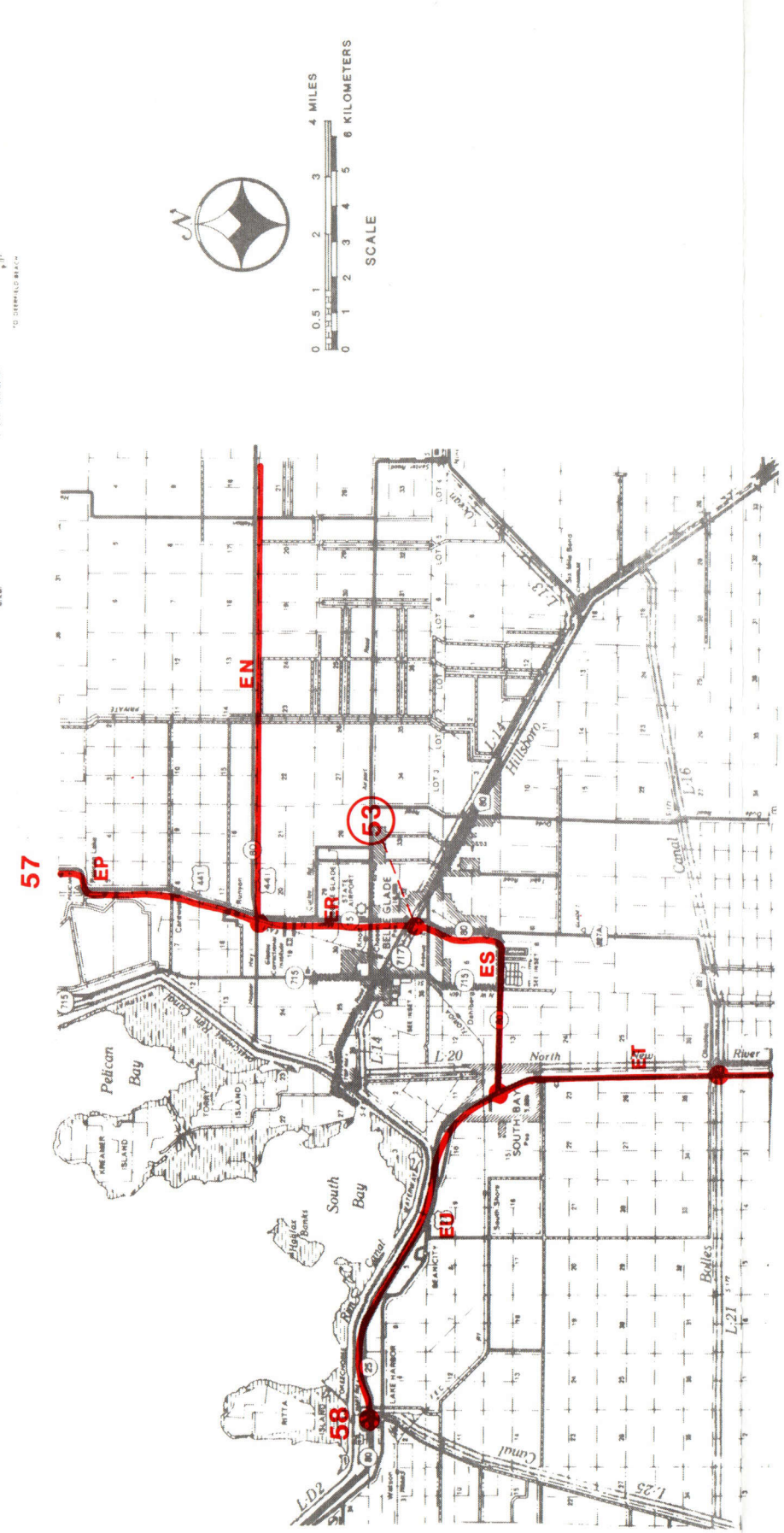
- ● INTERSECTION/INTERCHANGE LOCATION
- (12) ZONE LOCATION
- CN ROADWAY SEGMENT NAME
- 55 COUNTY EXIT POINT

NORTH PALM BEACH COUNTY

EVACUATION ROADWAY NETWORK

1 OF 2





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- ● INTERSECTION/INTERCHANGE LOCATION
- (12) ZONE LOCATION
- CN ROADWAY SEGMENT NAME
- 57 COUNTY EXIT POINT

2 OF 2

SOUTH PALM BEACH COUNTY AND BELLE GLADE

EVACUATION ROADWAY NETWORK

CATEGORY 1-2 LOW OCCUPANCY

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB01	7702					4700				
			405	3678	769	2845		243	2281	469	1704
ZONE NO	PB02	10943					6668				
			587	5146	1094	4113		349	3203	666	2447
ZONE NO	PB03	9102					5670				
			460	4500	909	3229		286	2815	567	2002
ZONE NO	PB04	9704					5836				
			538	4426	970	3768		312	2747	583	2190
ZONE NO	PB05	5058					3074				
			272	2365	505	1912		161	1471	307	1132
ZONE NO	PB06	11317					6935				
			598	5390	1130	4194		359	3359	692	2520
ZONE NO	PB07	2671					1649				
			138	1295	267	969		84	808	164	591
ZONE NO	PB08	4655					2883				
			237	2289	465	1662		145	1425	287	1021
ZONE NO	PB09	6046					3673				
			316	2911	604	2214		189	1791	367	1324
ZONE NO	PB10	13482					8367				
			689	6611	1347	4831		423	4131	835	2973
ZONE NO	PB11	11323					7003				
			585	5509	1132	4095		357	3440	700	2503
ZONE NO	PB12	14					6				
			2	4	0	5		1	2	0	1
ZONE NO	PB13	38					21				
			11	20	0	5		6	11	0	3
ZONE NO	PB14	38					21				
			11	20	0	5		6	11	0	3

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB15	117	34	63	0	17	61	18	33	0	9
ZONE NO	PB16	36	10	19	0	5	20	6	11	0	3
ZONE NO	PB17	56	15	28	0	10	30	8	15	0	5
ZONE NO	PB18	210	62	114	0	32	108	32	58	0	16
ZONE NO	PB19	284	85	156	0	42	145	43	79	0	21
ZONE NO	PB20	56	16	30	0	8	29	8	15	0	4
ZONE NO	PB21	32	9	17	0	4	17	5	9	0	2
ZONE NO	PB22	34	10	18	0	5	18	5	9	0	2
ZONE NO	PB23	72	21	39	0	10	37	11	20	0	5
ZONE NO	PB24	190	57	104	0	28	96	28	52	0	14
ZONE NO	PB25	78	23	42	0	11	40	12	22	0	6
ZONE NO	PB26	1347	403	740	0	201	679	203	373	0	101
ZONE NO	PB27	52	15	27	0	8	26	7	13	0	3
ZONE NO	PB28	1595	478	876	0	239	805	241	442	0	120

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB29	2653					1337				
			794	1456	0	400		400	734	0	201
ZONE NO	PB30	173					87				
			49	90	0	30		25	46	0	14
ZONE NO	PB31	487					246				
			144	265	0	75		73	134	0	37
ZONE NO	PB32	104					53				
			31	57	0	15		15	29	0	7
ZONE NO	PB33	1577					795				
			471	864	0	238		237	436	0	119
ZONE NO	PB34	5055					2548				
			1515	2777	0	760		763	1400	0	382
ZONE NO	PB35	626					317				
			187	343	0	94		94	173	0	47
ZONE NO	PB36	2215					1116				
			662	1214	0	335		334	612	0	168
ZONE NO	PB37	5527					2787				
			1656	3036	0	832		835	1531	0	418
ZONE NO	PB38	374					190				
			112	205	0	56		57	104	0	28
ZONE NO	PB39	8567					4319				
			2569	4710	0	1285		1295	2374	0	647
ZONE NO	PB40	547					277				
			163	299	0	82		82	151	0	41
ZONE NO	PB41	370					187				
			111	203	0	55		56	102	0	28
ZONE NO	PB42	311					158				
			93	170	0	46		47	86	0	23

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB43	242	71	130	0	38	124	36	67	0	19
ZONE NO	PB44	313	93	171	0	46	158	47	86	0	23
ZONE NO	PB45	138	40	73	0	23	71	20	37	0	11
ZONE NO	PB46	255	74	136	0	41	128	37	69	0	19
ZONE NO	PB47	132	38	70	0	21	67	19	36	0	9
ZONE NO	PB48	2013	603	1106	0	301	1016	304	558	0	152
ZONE NO	PB49	22	6	12	0	3	11	3	6	0	1
ZONE NO	PB50	166	49	90	0	25	86	25	46	0	12
ZONE NO	PB51	381	113	207	0	58	193	57	105	0	28
ZONE NO	PB52	53	15	28	0	7	27	8	14	0	4
ZONE NO	PB53	4460	1784	2453	0	223	2249	899	1236	0	112
		133014	17530	66602	9192	39556	77166	9316	38818	5637	23275

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CATEGORY 1-2 LOW OCCUPANCY
PALM BCH COUNTY, S.E.FLA.
INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.30	2.30	2.30	2.45	2.45	2.45	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	2.20	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.80	1.80	1.80	1.80	1.80	1.80	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.10	1.10	1.10	1.10	1.10	1.10	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	45.00	45.00	45.00	45.00	45.00	45.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	5.00	30.00	30.00	30.00	30.00	40.00	0.00	0.00	0.00	0.00
Friend	50.00	55.00	55.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	15.00	15.00	15.00	15.00	5.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7,8,9,10,11
GROUP # 2: 12,13,14,15,16,17,18,19,20,21
GROUP # 3: 22,23,24
GROUP # 4: 25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
GROUP # 5: 41,42,43,44,45,46,47,48,49,50,51,52
GROUP # 6: 53
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 1-2 HIGH OCCUPANCY

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB01	8131					4872				
			448	3721	812	3146		260	2298	486	1824
ZONE NO	PB02	11756					6993				
			668	5227	1175	4682		382	3236	699	2675
ZONE NO	PB03	9227					5721				
			473	4513	922	3317		291	2820	572	2037
ZONE NO	PB04	10769					6261				
			644	4532	1076	4513		355	2790	626	2488
ZONE NO	PB05	5466					3237				
			313	2406	546	2198		177	1487	323	1246
ZONE NO	PB06	11986					7202				
			665	5457	1197	4662		386	3386	719	2707
ZONE NO	PB07	2772					1690				
			148	1305	277	1040		88	812	168	619
ZONE NO	PB08	4750					2921				
			247	2299	475	1729		149	1429	291	1048
ZONE NO	PB09	6326					3785				
			344	2939	632	2410		200	1802	378	1402
ZONE NO	PB10	13805					8497				
			721	6643	1379	5058		436	4144	848	3064
ZONE NO	PB11	11704					7156				
			623	5547	1170	4362		372	3455	715	2610
ZONE NO	PB12	19					8				
			3	5	1	9		1	2	0	2
ZONE NO	PB13	38					21				
			11	20	0	5		6	11	0	3
ZONE NO	PB14	38					21				
			11	20	0	5		6	11	0	3

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB15	119					62				
			34	63	0	18		18	33	0	9
ZONE NO	PB16	37					20				
			10	19	0	5		6	11	0	3
ZONE NO	PB17	61					31				
			15	28	0	13		8	15	0	6
ZONE NO	PB18	212					108				
			62	114	0	33		32	58	0	16
ZONE NO	PB19	284					145				
			85	156	0	42		43	79	0	21
ZONE NO	PB20	56					29				
			16	30	0	8		8	15	0	4
ZONE NO	PB21	32					17				
			9	17	0	4		5	9	0	2
ZONE NO	PB22	34					18				
			10	18	0	5		5	9	0	2
ZONE NO	PB23	72					37				
			21	39	0	10		11	20	0	5
ZONE NO	PB24	190					96				
			57	104	0	28		28	52	0	14
ZONE NO	PB25	78					40				
			23	42	0	11		12	22	0	6
ZONE NO	PB26	1347					679				
			403	740	0	201		203	373	0	101
ZONE NO	PB27	53					26				
			15	27	0	9		7	13	0	3
ZONE NO	PB28	1596					806				
			478	876	0	240		241	442	0	120

1 = Public Shelter
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4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB29	2659					1339				
			795	1457	1	404		400	734	0	202
ZONE NO	PB30	181					90				
			50	91	1	36		25	46	0	16
ZONE NO	PB31	492					247				
			144	265	0	78		73	134	0	38
ZONE NO	PB32	105					53				
			31	57	0	15		15	29	0	7
ZONE NO	PB33	1582					796				
			471	864	0	241		237	436	0	120
ZONE NO	PB34	5060					2549				
			1515	2777	0	763		763	1400	0	383
ZONE NO	PB35	628					318				
			187	343	0	96		94	173	0	48
ZONE NO	PB36	2222					1119				
			663	1215	1	340		334	612	0	170
ZONE NO	PB37	5534					2790				
			1657	3037	1	837		835	1531	0	420
ZONE NO	PB38	375					190				
			112	205	0	56		57	104	0	28
ZONE NO	PB39	8569					4320				
			2569	4710	0	1287		1295	2374	0	648
ZONE NO	PB40	549					278				
			163	299	0	84		82	151	0	42
ZONE NO	PB41	370					187				
			111	203	0	55		56	102	0	28
ZONE NO	PB42	311					158				
			93	170	0	46		47	86	0	23

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB43	247	71	130	0	41	125	36	67	0	20
ZONE NO	PB44	315	93	171	0	47	159	47	86	0	23
ZONE NO	PB45	143	40	73	0	26	72	20	37	0	12
ZONE NO	PB46	262	75	137	1	46	131	37	69	0	21
ZONE NO	PB47	136	38	70	0	24	69	19	36	0	10
ZONE NO	PB48	2013	603	1106	0	301	1016	304	558	0	152
ZONE NO	PB49	22	6	12	0	3	11	3	6	0	1
ZONE NO	PB50	168	49	90	0	27	87	25	46	0	13
ZONE NO	PB51	385	113	207	0	60	194	57	105	0	29
ZONE NO	PB52	54	15	28	0	8	28	8	14	0	4
ZONE NO	PB53	4460	1784	2453	0	223	2249	899	1236	0	112
		137801	18005	67077	9667	42907	79076	9504	39006	5825	24610

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CATEGORY 1-2 HIGH OCCUPANCY
PALM BCH COUNTY, S.E.FLA.
INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.30	2.30	2.30	2.45	2.45	2.45	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	2.20	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.80	1.80	1.80	1.80	1.80	1.80	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.10	1.10	1.10	1.10	1.10	1.10	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	90.00	90.00	90.00	90.00	90.00	90.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	5.00	30.00	30.00	30.00	30.00	40.00	0.00	0.00	0.00	0.00
Friend	50.00	55.00	55.00	55.00	55.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	35.00	15.00	15.00	15.00	15.00	5.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7,8,9,10,11
GROUP # 2: 12,13,14,15,16,17,18,19,20,21
GROUP # 3: 22,23,24
GROUP # 4: 25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
GROUP # 5: 41,42,43,44,45,46,47,48,49,50,51,52
GROUP # 6: 53
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 3 LOW OCCUPANCY

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB01	7702					4700				
			405	2587	769	3936		243	1601	469	2384
ZONE NO	PB02	10943					6668				
			587	3626	1094	5633		349	2252	666	3398
ZONE NO	PB03	9102					5670				
			460	3153	909	4576		286	1972	567	2845
ZONE NO	PB04	9704					5836				
			538	3130	970	5064		312	1935	583	3002
ZONE NO	PB05	5058					3074				
			272	1667	505	2610		161	1034	307	1569
ZONE NO	PB06	11317					6935				
			598	3792	1130	5792		359	2359	692	3520
ZONE NO	PB07	2671					1649				
			138	909	267	1355		84	567	164	832
ZONE NO	PB08	4655					2883				
			237	1605	465	2346		145	998	287	1448
ZONE NO	PB09	6046					3673				
			316	2046	604	3079		189	1257	367	1858
ZONE NO	PB10	13482					8367				
			689	4637	1347	6805		423	2895	835	4209
ZONE NO	PB11	11323					7003				
			585	3867	1132	5737		357	2412	700	3531
ZONE NO	PB12	2853					1336				
			284	967	199	1400		133	507	86	607
ZONE NO	PB13	7835					4291				
			782	3914	391	2743		428	2144	214	1502
ZONE NO	PB14	8035					4395				
			802	4001	402	2825		439	2191	220	1542

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB15	8914					4830				
			891	4356	458	3207		482	2379	245	1720
ZONE NO	PB16	7449					4064				
			744	3690	376	2636		405	2019	203	1431
ZONE NO	PB17	11389					6064				
			1138	5338	613	4297		606	2907	318	2230
ZONE NO	PB18	8922					4802				
			891	4301	465	3261		479	2344	246	1729
ZONE NO	PB19	7838					4284				
			783	3919	391	2743		428	2142	214	1499
ZONE NO	PB20	1655					902				
			164	824	82	580		90	450	45	316
ZONE NO	PB21	6534					3579				
			653	3267	326	2286		357	1789	178	1252
ZONE NO	PB22	68					37				
			23	30	0	13		12	16	0	7
ZONE NO	PB23	86					45				
			30	38	0	17		15	20	0	9
ZONE NO	PB24	206					105				
			72	92	0	41		36	47	0	21
ZONE NO	PB25	156					81				
			54	70	0	31		28	36	0	16
ZONE NO	PB26	1449					731				
			506	651	0	289		255	328	0	146
ZONE NO	PB27	103					52				
			35	45	0	22		17	22	0	10
ZONE NO	PB28	1742					881				
			609	783	0	349		308	396	0	176

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB29	2707					1364				
			944	1214	1	546		476	612	0	274
ZONE NO	PB30	345					175				
			115	148	1	77		59	76	0	37
ZONE NO	PB31	582					293				
			200	257	0	120		101	130	0	60
ZONE NO	PB32	209					107				
			72	93	0	41		37	48	0	21
ZONE NO	PB33	1686					849				
			586	754	0	341		296	380	0	171
ZONE NO	PB34	5146					2593				
			1797	2311	0	1033		906	1165	0	520
ZONE NO	PB35	770					391				
			268	344	0	156		136	175	0	78
ZONE NO	PB36	2384					1203				
			830	1067	1	483		419	539	0	242
ZONE NO	PB37	5742					2896				
			2005	2578	1	1154		1011	1300	0	581
ZONE NO	PB38	481					244				
			168	216	0	96		85	109	0	48
ZONE NO	PB39	8675					4374				
			3034	3901	0	1737		1530	1967	0	875
ZONE NO	PB40	695					352				
			241	310	0	141		122	157	0	71
ZONE NO	PB41	450					228				
			157	202	0	90		79	102	0	45
ZONE NO	PB42	433					220				
			151	194	0	86		77	99	0	44

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB43	485					248				
			166	214	0	101		85	110	0	51
ZONE NO	PB44	421					214				
			146	188	0	84		74	95	0	42
ZONE NO	PB45	277					141				
			93	120	0	59		48	62	0	29
ZONE NO	PB46	444					226				
			151	194	1	95		77	99	0	47
ZONE NO	PB47	264					135				
			89	115	0	56		46	59	0	27
ZONE NO	PB48	2249					1138				
			786	1011	0	449		398	512	0	227
ZONE NO	PB49	44					22				
			15	19	0	8		7	9	0	4
ZONE NO	PB50	334					172				
			115	148	0	69		59	76	0	35
ZONE NO	PB51	509					257				
			175	225	0	104		89	114	0	52
ZONE NO	PB52	106					55				
			36	46	0	21		18	24	0	10
ZONE NO	PB53	4524					2282				
			1809	2488	0	226		912	1255	0	114
		207199	27435	85662	12900	81046	117119	14573	48293	7606	46514

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 3 LOW OCCUPANCY

PALM BCH COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.30	2.30	2.30	2.45	2.45	2.45	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	2.20	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.80	1.80	1.80	1.80	1.80	1.80	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.10	1.10	1.10	1.10	1.10	1.10	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	45.00	45.00	45.00	45.00	45.00	45.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	5.00	10.00	35.00	35.00	35.00	40.00	0.00	0.00	0.00	0.00
Friend	35.00	50.00	45.00	45.00	45.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	35.00	20.00	20.00	20.00	5.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7,8,9,10,11
GROUP # 2: 12,13,14,15,16,17,18,19,20,21
GROUP # 3: 22,23,24
GROUP # 4: 25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
GROUP # 5: 41,42,43,44,45,46,47,48,49,50,51,52
GROUP # 6: 53
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 3 HIGH OCCUPANCY

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB01	8131					4872				
			448	2630	812	4237		260	1618	486	2504
ZONE NO	PB02	11756					6993				
			668	3707	1175	6202		382	2285	699	3626
ZONE NO	PB03	9227					5721				
			473	3166	922	4664		291	1977	572	2880
ZONE NO	PB04	10769					6261				
			644	3236	1076	5809		355	1978	626	3300
ZONE NO	PB05	5466					3237				
			313	1708	546	2896		177	1050	323	1683
ZONE NO	PB06	11986					7202				
			665	3859	1197	6260		386	2386	719	3707
ZONE NO	PB07	2772					1690				
			148	919	277	1426		88	571	168	860
ZONE NO	PB08	4750					2921				
			247	1615	475	2413		149	1002	291	1475
ZONE NO	PB09	6326					3785				
			344	2074	632	3275		200	1268	378	1936
ZONE NO	PB10	13805					8497				
			721	4669	1379	7032		436	2908	848	4300
ZONE NO	PB11	11704					7156				
			623	3905	1170	6004		372	2427	715	3638
ZONE NO	PB12	4001					1737				
			399	1082	314	2203		173	547	126	888
ZONE NO	PB13	7842					4294				
			783	3915	392	2748		428	2144	214	1504
ZONE NO	PB14	8073					4408				
			806	4005	406	2852		440	2192	221	1551

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB15	9167					4919				
			916	4381	483	3384		491	2388	254	1782
ZONE NO	PB16	7534					4094				
			753	3699	385	2696		408	2022	206	1452
ZONE NO	PB17	12278					6375				
			1227	5427	702	4919		637	2938	349	2448
ZONE NO	PB18	9320					4942				
			931	4341	505	3540		493	2358	260	1827
ZONE NO	PB19	7838					4284				
			783	3919	391	2743		428	2142	214	1499
ZONE NO	PB20	1662					905				
			165	825	83	585		90	450	45	318
ZONE NO	PB21	6534					3579				
			653	3267	326	2286		357	1789	178	1252
ZONE NO	PB22	68					37				
			23	30	0	13		12	16	0	7
ZONE NO	PB23	86					45				
			30	38	0	17		15	20	0	9
ZONE NO	PB24	206					105				
			72	92	0	41		36	47	0	21
ZONE NO	PB25	156					81				
			54	70	0	31		28	36	0	16
ZONE NO	PB26	1450					732				
			506	651	0	290		255	328	0	146
ZONE NO	PB27	107					53				
			35	45	0	24		17	22	0	11
ZONE NO	PB28	1745					882				
			609	783	0	351		308	396	0	177

1 = Public Shelter
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4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB29	2718					1368				
			945	1215	2	554		476	612	0	277
ZONE NO	PB30	363					181				
			117	150	3	89		60	77	1	41
ZONE NO	PB31	591					297				
			201	258	1	127		101	130	0	62
ZONE NO	PB32	210					108				
			72	93	0	42		37	48	0	21
ZONE NO	PB33	1695					853				
			587	755	1	348		296	380	0	173
ZONE NO	PB34	5155					2597				
			1798	2312	1	1040		906	1165	0	522
ZONE NO	PB35	775					392				
			268	344	0	159		136	175	0	79
ZONE NO	PB36	2398					1208				
			831	1068	2	493		419	539	0	245
ZONE NO	PB37	5756					2901				
			2006	2579	2	1164		1011	1300	0	584
ZONE NO	PB38	482					245				
			168	216	0	97		85	109	0	48
ZONE NO	PB39	8681					4376				
			3035	3902	1	1741		1530	1967	0	876
ZONE NO	PB40	701					354				
			242	311	1	145		122	157	0	72
ZONE NO	PB41	450					228				
			157	202	0	90		79	102	0	45
ZONE NO	PB42	434					221				
			151	194	0	87		77	99	0	44

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4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB43	493					251				
			167	215	1	107		85	110	0	53
ZONE NO	PB44	423					215				
			146	188	0	86		74	95	0	43
ZONE NO	PB45	285					144				
			94	121	1	65		48	62	0	31
ZONE NO	PB46	457					231				
			152	195	2	105		77	99	0	50
ZONE NO	PB47	271					137				
			90	116	1	61		46	59	0	29
ZONE NO	PB48	2250					1139				
			786	1011	0	450		398	512	0	227
ZONE NO	PB49	44					22				
			15	19	0	8		7	9	0	4
ZONE NO	PB50	339					173				
			115	148	0	72		59	76	0	36
ZONE NO	PB51	515					260				
			176	226	1	109		89	114	0	54
ZONE NO	PB52	108					56				
			36	46	0	23		18	24	0	11
ZONE NO	PB53	4524					2282				
			1809	2488	0	226		912	1255	0	114
		214879	28203	86430	13668	86429	120041	14860	48580	7893	48558

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 3 HIGH OCCUPANCY

PALM BCH COUNTY, S.E.FLA.

INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.30	2.30	2.30	2.45	2.45	2.45	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	2.20	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.80	1.80	1.80	1.80	1.80	1.80	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.10	1.10	1.10	1.10	1.10	1.10	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	90.00	90.00	90.00	90.00	90.00	90.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	5.00	10.00	35.00	35.00	35.00	40.00	0.00	0.00	0.00	0.00
Friend	35.00	50.00	45.00	45.00	45.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	35.00	20.00	20.00	20.00	5.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7,8,9,10,11
GROUP # 2: 12,13,14,15,16,17,18,19,20,21
GROUP # 3: 22,23,24
GROUP # 4: 25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
GROUP # 5: 41,42,43,44,45,46,47,48,49,50,51,52
GROUP # 6: 53
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 4-5 LOW OCCUPANCY

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB01	7702					4700				
			405	2587	769	3936		243	1601	469	2384
ZONE NO	PB02	10943					6668				
			587	3626	1094	5633		349	2252	666	3398
ZONE NO	PB03	9102					5670				
			460	3153	909	4576		286	1972	567	2845
ZONE NO	PB04	9704					5836				
			538	3130	970	5064		312	1935	583	3002
ZONE NO	PB05	5058					3074				
			272	1667	505	2610		161	1034	307	1569
ZONE NO	PB06	11317					6935				
			598	3792	1130	5792		359	2359	692	3520
ZONE NO	PB07	2671					1649				
			138	909	267	1355		84	567	164	832
ZONE NO	PB08	4655					2883				
			237	1605	465	2346		145	998	287	1448
ZONE NO	PB09	6046					3673				
			316	2046	604	3079		189	1257	367	1858
ZONE NO	PB10	13482					8367				
			689	4637	1347	6805		423	2895	835	4209
ZONE NO	PB11	11323					7003				
			585	3867	1132	5737		357	2412	700	3531
ZONE NO	PB12	2853					1336				
			284	967	199	1400		133	507	86	607
ZONE NO	PB13	7835					4291				
			782	3914	391	2743		428	2144	214	1502
ZONE NO	PB14	8035					4395				
			802	4001	402	2825		439	2191	220	1542

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB15	8914					4830				
			891	4356	458	3207		482	2379	245	1720
ZONE NO	PB16	7449					4064				
			744	3690	376	2636		405	2019	203	1431
ZONE NO	PB17	11389					6064				
			1138	5338	613	4297		606	2907	318	2230
ZONE NO	PB18	8922					4802				
			891	4301	465	3261		479	2344	246	1729
ZONE NO	PB19	7838					4284				
			783	3919	391	2743		428	2142	214	1499
ZONE NO	PB20	1655					902				
			164	824	82	580		90	450	45	316
ZONE NO	PB21	6534					3579				
			653	3267	326	2286		357	1789	178	1252
ZONE NO	PB22	6858					3755				
			1027	4451	0	1375		562	2438	0	752
ZONE NO	PB23	2848					1558				
			427	1851	0	569		233	1012	0	311
ZONE NO	PB24	3288					1794				
			493	2137	0	657		269	1166	0	358
ZONE NO	PB25	314					162				
			109	141	0	62		56	72	0	32
ZONE NO	PB26	1652					837				
			577	742	0	331		292	376	0	167
ZONE NO	PB27	207					105				
			70	90	0	44		36	46	0	21
ZONE NO	PB28	2039					1033				
			711	915	0	409		360	463	0	207

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB29	2816					1418				
			979	1259	2	573		493	634	0	287
ZONE NO	PB30	693					350				
			233	299	3	155		119	153	1	75
ZONE NO	PB31	771					389				
			264	339	1	163		133	171	0	80
ZONE NO	PB32	418					215				
			145	187	0	84		74	96	0	42
ZONE NO	PB33	1901					959				
			659	847	1	389		333	428	0	194
ZONE NO	PB34	5327					2686				
			1858	2389	1	1074		937	1205	0	539
ZONE NO	PB35	1061					539				
			368	473	0	216		187	241	0	109
ZONE NO	PB36	2720					1374				
			944	1213	2	557		477	613	0	278
ZONE NO	PB37	6168					3113				
			2151	2765	2	1247		1086	1396	0	626
ZONE NO	PB38	692					353				
			241	310	0	139		123	158	0	70
ZONE NO	PB39	8893					4484				
			3109	3997	1	1783		1568	2016	0	898
ZONE NO	PB40	991					503				
			344	442	1	203		174	224	0	101
ZONE NO	PB41	610					311				
			213	274	0	122		108	139	0	62
ZONE NO	PB42	678					346				
			236	304	0	136		120	155	0	69

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB43	971					497				
			334	430	1	202		171	220	0	102
ZONE NO	PB44	639					326				
			221	285	0	129		113	145	0	65
ZONE NO	PB45	555					283				
			189	243	1	119		96	124	0	59
ZONE NO	PB46	823					419				
			280	360	2	178		143	184	0	87
ZONE NO	PB47	529					269				
			180	232	1	112		92	118	0	55
ZONE NO	PB48	2726					1383				
			953	1225	0	545		483	621	0	276
ZONE NO	PB49	88					45				
			30	39	0	17		15	20	0	9
ZONE NO	PB50	669					343				
			231	297	0	138		119	153	0	70
ZONE NO	PB51	759					386				
			262	336	1	158		133	171	0	79
ZONE NO	PB52	214					110				
			73	94	0	45		37	48	0	22
ZONE NO	PB53	4654					2348				
			1861	2559	0	232		939	1291	0	117
		227000	31729	97121	12915	85074	127696	16836	54451	7607	48643

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

CATEGORY 5-6 LOW OCCUPANCY
PALM BCH COUNTY, S.E.FLA.
INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.30	2.30	2.30	2.45	2.45	2.45	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	2.20	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.80	1.80	1.80	1.80	1.80	1.80	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.10	1.10	1.10	1.10	1.10	1.10	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	2.00	2.00	2.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	45.00	45.00	45.00	45.00	45.00	45.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	5.00	10.00	15.00	35.00	35.00	40.00	0.00	0.00	0.00	0.00
Friend	35.00	50.00	65.00	45.00	45.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	35.00	20.00	20.00	20.00	5.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7,8,9,10,11
GROUP # 2: 12,13,14,15,16,17,18,19,20,21
GROUP # 3: 22,23,24
GROUP # 4: 25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
GROUP # 5: 41,42,43,44,45,46,47,48,49,50,51,52
GROUP # 6: 53
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE

CATEGORY 4-5 HIGH OCCUPANCY

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB01	8131					4872				
			448	2630	812	4237		260	1618	486	2504
ZONE NO	PB02	11756					6993				
			668	3707	1175	6202		382	2285	699	3626
ZONE NO	PB03	9227					5721				
			473	3166	922	4664		291	1977	572	2880
ZONE NO	PB04	10769					6261				
			644	3236	1076	5809		355	1978	626	3300
ZONE NO	PB05	5466					3237				
			313	1708	546	2896		177	1050	323	1683
ZONE NO	PB06	11986					7202				
			665	3859	1197	6260		386	2386	719	3707
ZONE NO	PB07	2772					1690				
			148	919	277	1426		88	571	168	860
ZONE NO	PB08	4750					2921				
			247	1615	475	2413		149	1002	291	1475
ZONE NO	PB09	6326					3785				
			344	2074	632	3275		200	1268	378	1936
ZONE NO	PB10	13805					8497				
			721	4669	1379	7032		436	2908	848	4300
ZONE NO	PB11	11704					7156				
			623	3905	1170	6004		372	2427	715	3638
ZONE NO	PB12	4001					1737				
			399	1082	314	2203		173	547	126	888
ZONE NO	PB13	7842					4294				
			783	3915	392	2748		428	2144	214	1504
ZONE NO	PB14	8073					4408				
			806	4005	406	2852		440	2192	221	1551

1 = Public Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB15	9167	916	4381	483	3384	4919	491	2388	254	1782
ZONE NO	PB16	7534	753	3699	385	2696	4094	408	2022	206	1452
ZONE NO	PB17	12278	1227	5427	702	4919	6375	637	2938	349	2448
ZONE NO	PB18	9320	931	4341	505	3540	4942	493	2358	260	1827
ZONE NO	PB19	7838	783	3919	391	2743	4284	428	2142	214	1499
ZONE NO	PB20	1662	165	825	83	585	905	90	450	45	318
ZONE NO	PB21	6534	653	3267	326	2286	3579	357	1789	178	1252
ZONE NO	PB22	6868	1028	4452	1	1382	3759	562	2438	0	754
ZONE NO	PB23	2848	427	1851	0	569	1558	233	1012	0	311
ZONE NO	PB24	3288	493	2137	0	657	1794	269	1166	0	358
ZONE NO	PB25	314	109	141	0	62	162	56	72	0	32
ZONE NO	PB26	1635	577	742	0	333	838	292	376	0	168
ZONE NO	PB27	214	71	91	1	49	108	36	46	0	23
ZONE NO	PB28	2043	711	915	0	412	1034	360	463	0	208

1 = Public Shelter
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4 = Out of County

PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB29	2838					1425				
			981	1261	4	588		494	635	1	292
ZONE NO	PB30	727					362				
			236	302	6	179		120	154	2	84
ZONE NO	PB31	791					396				
			266	341	3	177		134	172	1	85
ZONE NO	PB32	420					215				
			145	187	0	85		74	96	0	42
ZONE NO	PB33	1921					966				
			661	849	3	403		334	429	1	199
ZONE NO	PB34	5347					2693				
			1860	2391	3	1088		938	1206	1	544
ZONE NO	PB35	1070					542				
			369	474	1	222		187	241	0	111
ZONE NO	PB36	2747					1383				
			947	1216	5	576		478	614	1	285
ZONE NO	PB37	6195					3122				
			2154	2768	5	1266		1087	1397	1	633
ZONE NO	PB38	693					353				
			241	310	0	140		123	158	0	70
ZONE NO	PB39	8903					4487				
			3110	3998	2	1790		1568	2016	0	901
ZONE NO	PB40	1001					506				
			345	443	2	210		174	224	0	104
ZONE NO	PB41	611					311				
			213	274	0	122		108	139	0	62
ZONE NO	PB42	681					347				
			236	304	0	138		120	155	0	70

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PALM BCH COUNTY, S.E.FLA. EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

		Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE NO	PB43	989					503				
			336	432	3	214		172	221	1	106
ZONE NO	PB44	645					328				
			222	286	1	133		113	145	0	66
ZONE NO	PB45	573					289				
			191	245	3	131		97	125	1	63
ZONE NO	PB46	851					428				
			283	363	5	197		144	185	1	94
ZONE NO	PB47	544					275				
			182	234	3	123		93	119	1	59
ZONE NO	PB48	2729					1384				
			953	1225	0	547		483	621	0	277
ZONE NO	PB49	88					45				
			30	39	0	17		15	20	0	9
ZONE NO	PB50	677					346				
			232	298	1	144		119	153	0	72
ZONE NO	PB51	772					390				
			263	337	2	167		133	171	0	82
ZONE NO	PB52	219					111				
			73	94	0	48		37	48	0	23
ZONE NO	PB53	4654					2348				
			1861	2559	0	232		939	1291	0	117
		234856	32516	97908	13702	90575	130680	17133	54748	7904	50734

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CATEGORY 4-5 HIGH OCCUPANCY
PALM BCH COUNTY, S.E.FLA.
INPUT PARAMETERS BY GROUP

GROUPS	1	2	3	4	5	6	7	8	9	10
Number of People Per M. H. Unit	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
Number of People Per Permt Unit	2.30	2.30	2.30	2.45	2.45	2.45	0.00	0.00	0.00	0.00
Number of People Per Tourist Unit	2.20	2.20	2.20	2.20	2.20	2.20	0.00	0.00	0.00	0.00
Number of Vehicles Per Unit	1.80	1.80	1.80	1.80	1.80	1.80	0.00	0.00	0.00	0.00
Number of Vehicles Per Tourist Unit	1.10	1.10	1.10	1.10	1.10	1.10	0.00	0.00	0.00	0.00
% Participation of M.H. Units	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00
% Participation of Other Units	100.00	100.00	100.00	2.00	2.00	2.00	0.00	0.00	0.00	0.00
% Occupancy of Tourist Units	90.00	90.00	90.00	90.00	90.00	90.00	0.00	0.00	0.00	0.00
% Distribution: Public Shelters	5.00	10.00	15.00	35.00	35.00	40.00	0.00	0.00	0.00	0.00
Friend	35.00	50.00	65.00	45.00	45.00	55.00	0.00	0.00	0.00	0.00
Hotel/Motel	10.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Out of County	50.00	35.00	20.00	20.00	20.00	5.00	0.00	0.00	0.00	0.00
Vehicle Usage %	80.00	70.00	70.00	70.00	70.00	70.00	0.00	0.00	0.00	0.00

GROUP # 1: 1,2,3,4,5,6,7,8,9,10,11
GROUP # 2: 12,13,14,15,16,17,18,19,20,21
GROUP # 3: 22,23,24
GROUP # 4: 25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
GROUP # 5: 41,42,43,44,45,46,47,48,49,50,51,52
GROUP # 6: 53
GROUP # 7: NONE
GROUP # 8: NONE
GROUP # 9: NONE
GROUP #10: NONE